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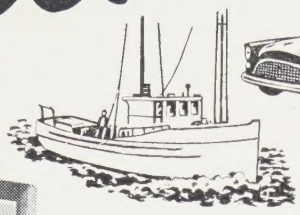

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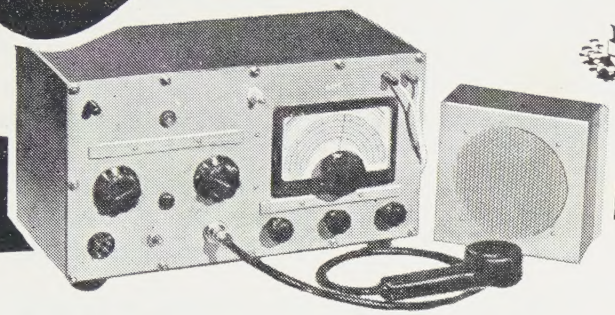

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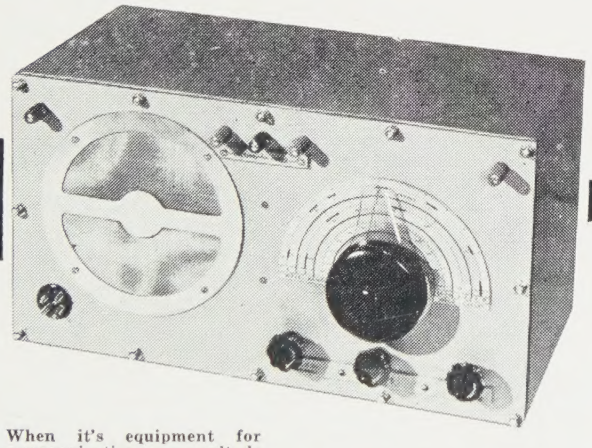

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The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of island territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific island territories. It is concerned with health, economic and social matters. Its headquarters are at Nouméa, New Caledonia.

The Commission consists of not more than twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

The Research Council meets once a year. Members are appointed by the Commission, and are selected for their special knowledge of the programme of the Commission, and of the problems of the territories in relation to the work of the Commission. The Research Council advises the Commission on its programme and gives special consideration to research matters. The carrying out of approved research is the responsibility of the Secretary-General and other principal officers.

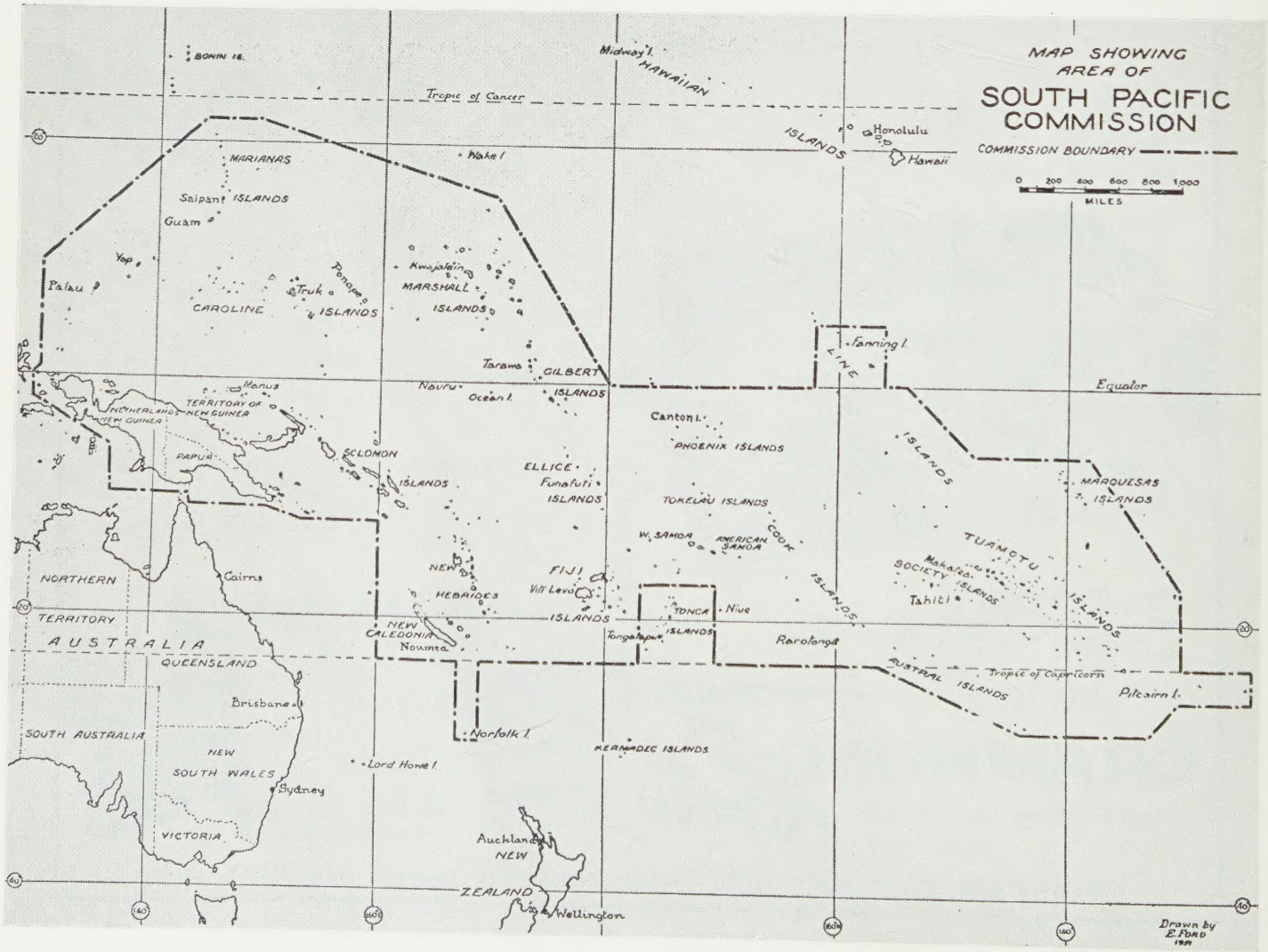
The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Fiji in April 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April 1953. The third Conference was held in Fiji in April-May 1956.

The principal officers of the Commission are: Secretary-General, Dr. Ralph Clairon Bedell; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Dr. Richard Seddon. The powers and functions of the Deputy Chairman, Research Council, are exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

FRONT COVER PHOTOGRAPH

Papuans engaged in mechanized farming in the Nimboran area of Netherlands New Guinea.



SPC QUARTERLY BULLETIN

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THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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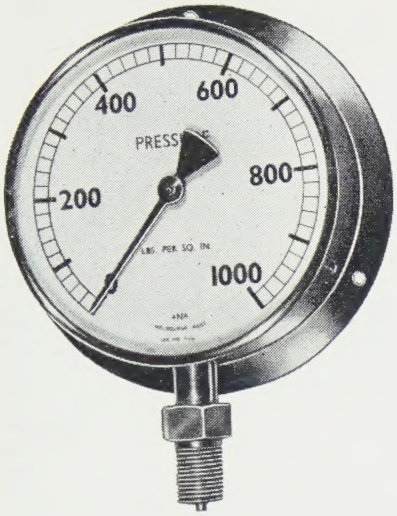

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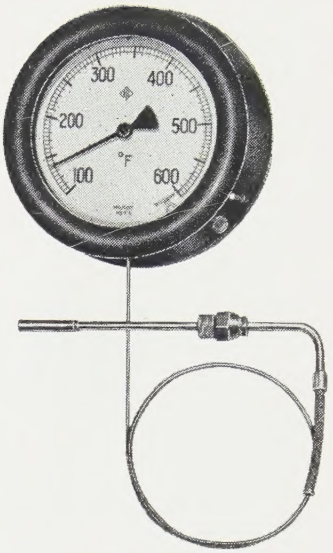

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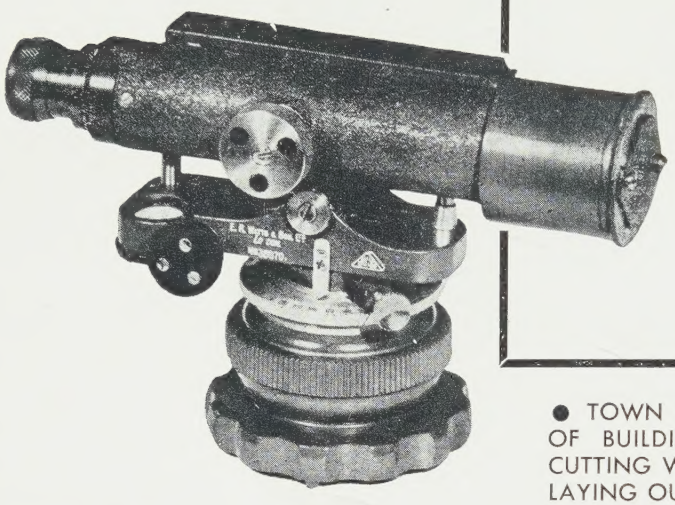

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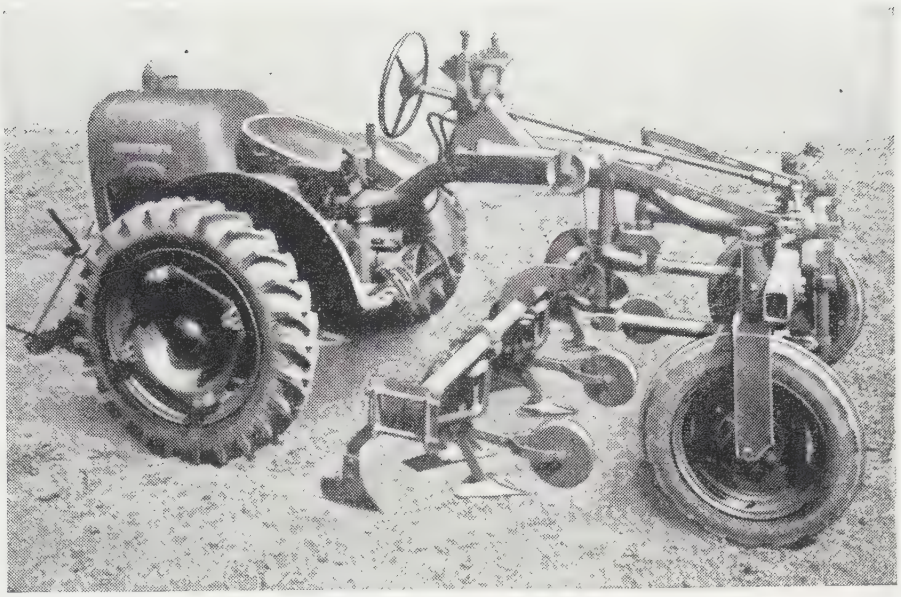

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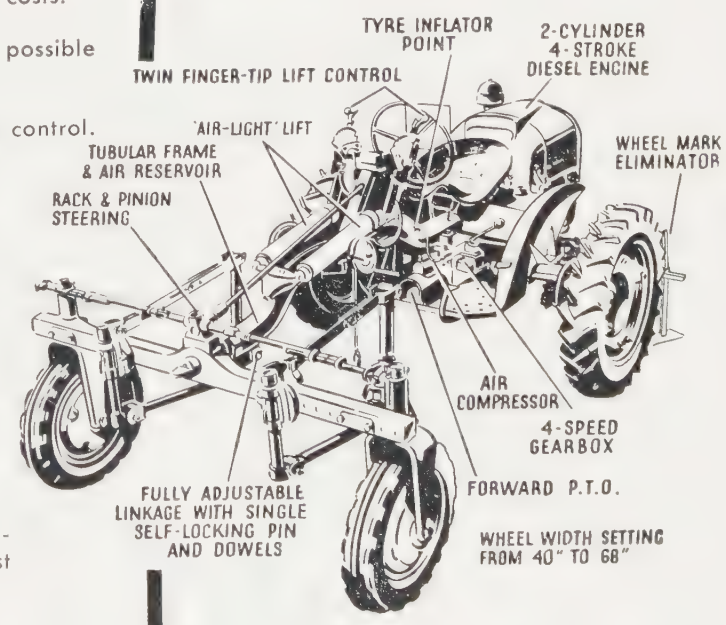

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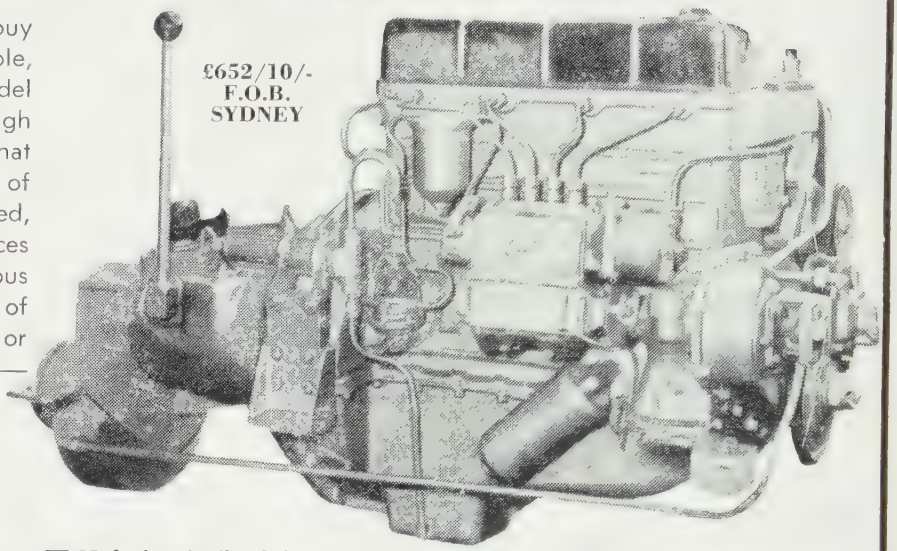

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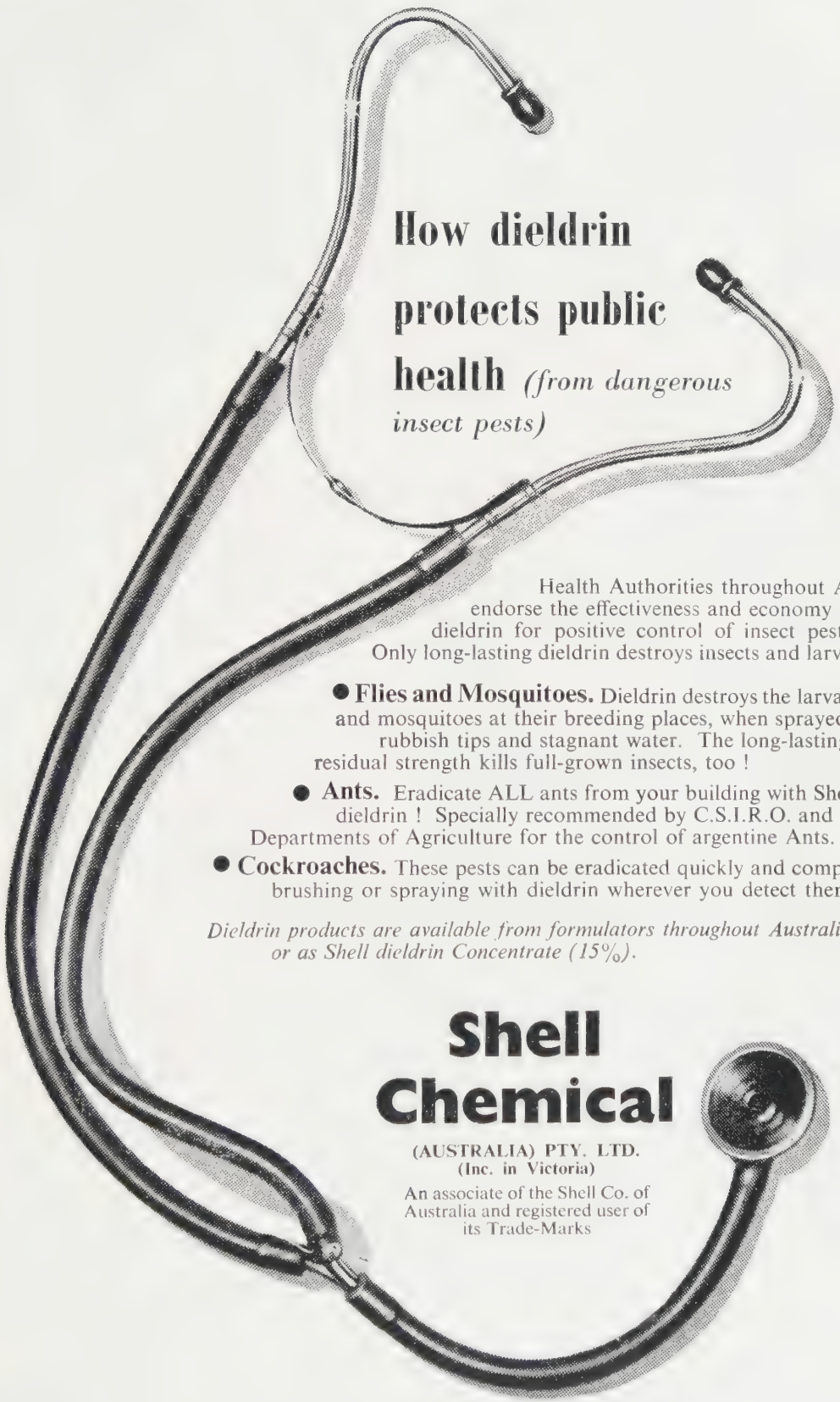

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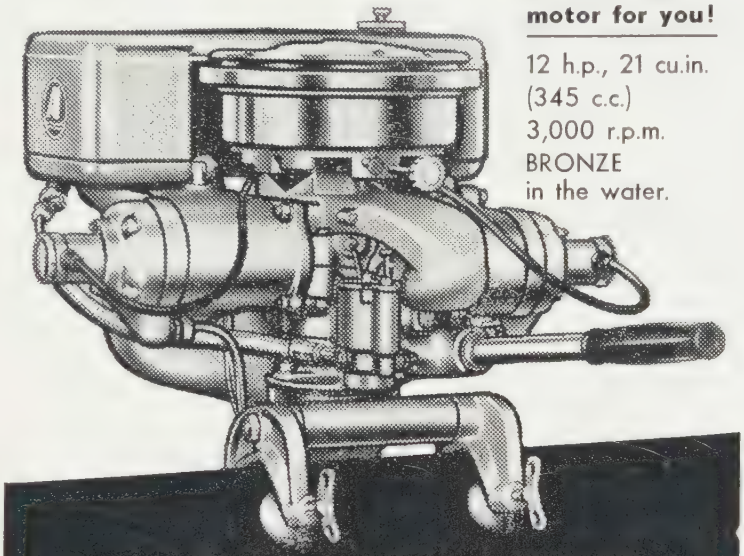

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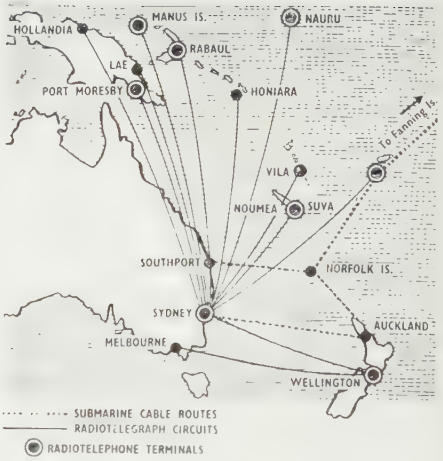

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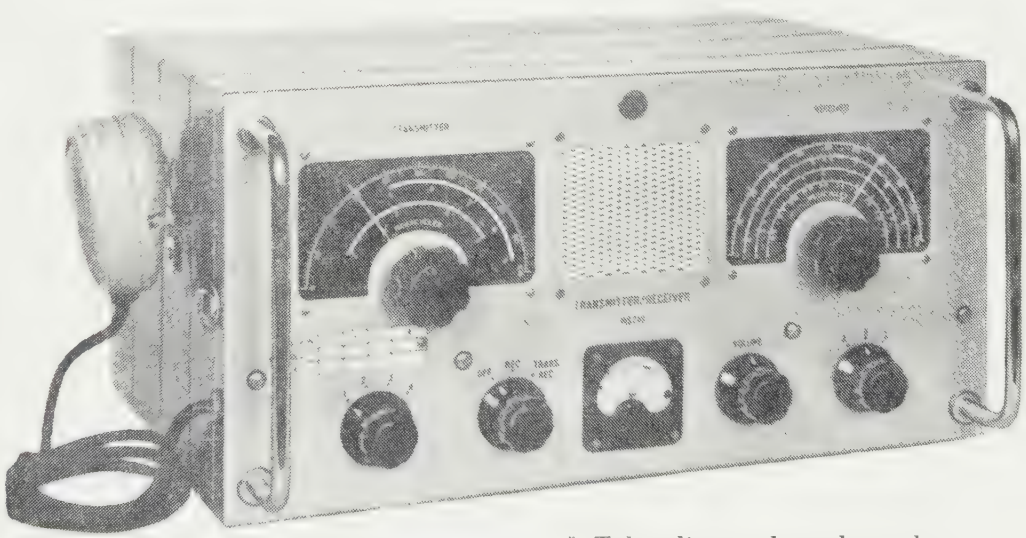

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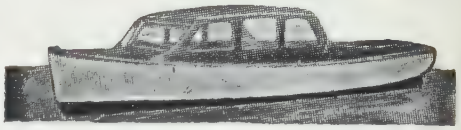

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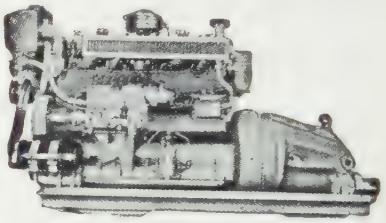

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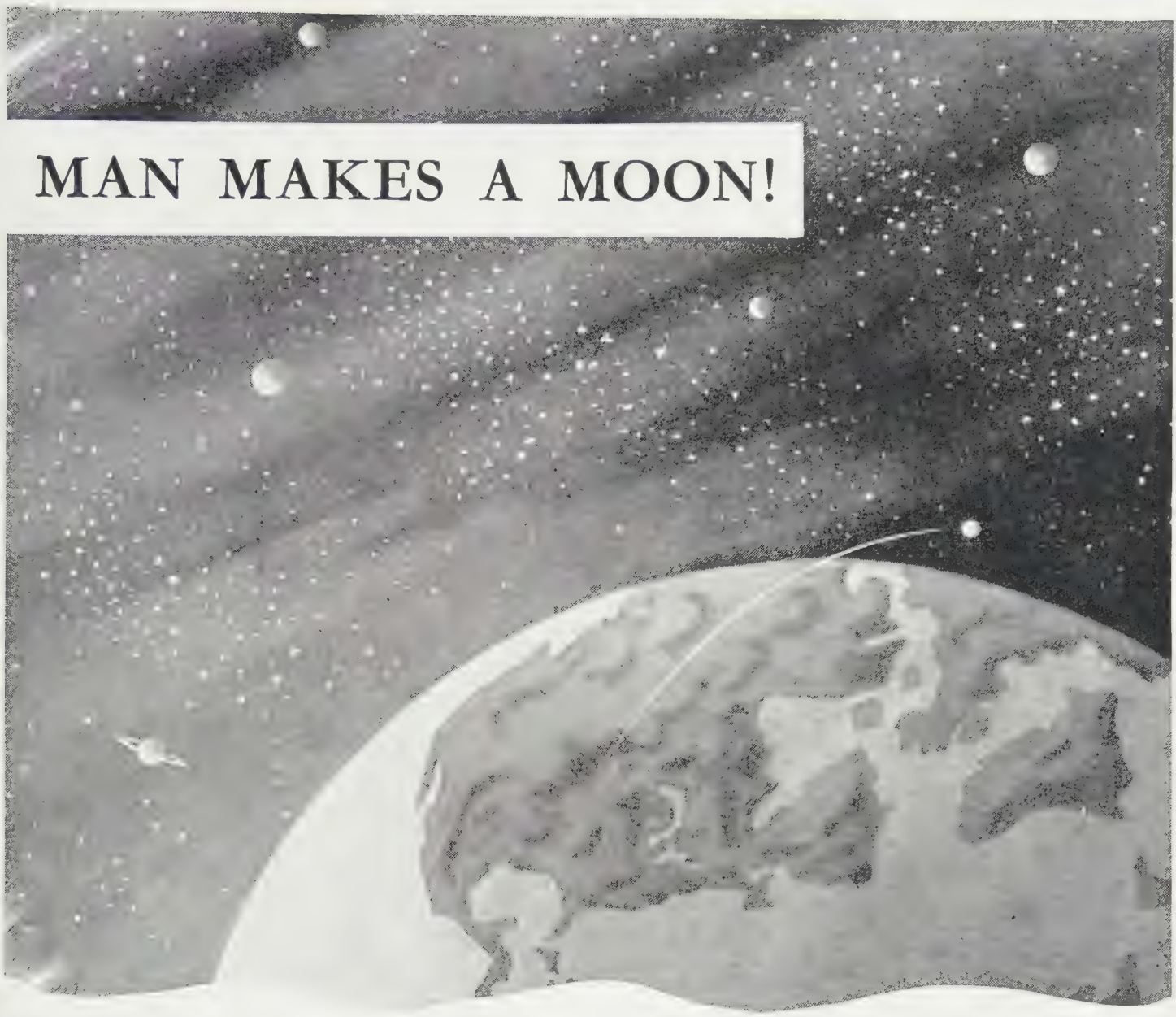

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Dr. Emile Massal, Executive Officer for Health, South Pacific Commission, addressing trainees at the opening of the Health Education Training Course at Commission headquarters in Noumea on 1st July last. Seated (left to right) are: Mr. Lynford L. Keyes, Regional Adviser for Health Education of the Public, Western Pacific Regional Office of the World Health Organization, Manila; Dr. Morven S. Brown, Professor of Sociology, Head of the School of Humanities and Social Sciences, N.S.W. University of Technology (who was Director of the Course); His Excellency the Governor of New Caledonia, M. Grimald; Dr. Ralph Clairon Bedell, Secretary-General of the South Pacific Commission.

Pacific Islanders Study Health Education By Group Methods

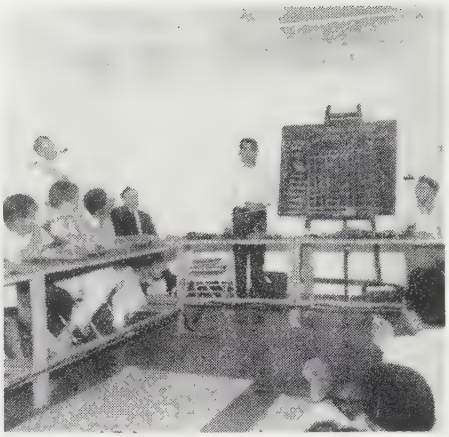
By EMILE MASSAL and A. L. SCHERZER*

PICTURE in your mind the group of thirty-nine health workers and teachers from fifteen Pacific islands who, on July 1, 1957, came together to live and work in Noumea, New Caledonia, for a special eight weeks' course in health education. This is the Course that had been planned for many months previously as a joint venture between the South Pacific Commission and the World Health Organization.

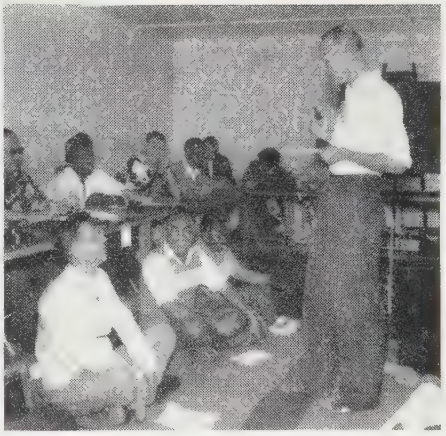
The trainees were selected by their respective territories and sent to the Course with the understanding that it would prepare them to more effectively carry out health education as part of their normal work. They came from American Samoa (3), Solomon Islands (1), Cook Islands (3), Fiji (2), Guam

* Dr. Massal is Executive Officer for Health, South Pacific Commission. Dr. Scherzer is a World Health Organization health education specialist who will work with the South Pacific Commission following up the recent Health Education Training Course. He will visit trainees in their own territories and give them any further help they may need. On request he will also work with territories on their own health education programmes, possibly to integrate them more closely with the Commission's work in this highly-specialized field.

Trainees and Course staff members listening to the opening addresses.



ABOVE: The Student-Staff Planning Committee was responsible for planning the detailed programme of the Course. Here the committee meets to consider several aspects of Course activities. CENTRE: Both before and after Study Group discussions, the entire group of trainees met together in plenary sessions. In this one, the way in which discussion groups should function is considered. ABOVE RIGHT: Plenary sessions served to introduce new ideas to the group and often to summarize discussions of the Study Groups. Here is a presentation concerning the place of health in the community.



RIGHT: Topics were often summarized by the use of role-playing. In this technique, students take on the role of some individual in the community and act out a familiar situation. Important points to consider in human relations are thus brought out for discussion. RIGHT, CENTRE: This is a role-play situation in which the sanitarian is having a meeting with village dignitaries and officials. RIGHT, BOTTOM: Here students from Papua and New Guinea in native costume act out a familiar village scene. The principles brought out form the basis of discussion for the entire group of trainees.

(2), Nauru (1), Niue (1), Netherlands New Guinea (2), New Caledonia (4), New Hebrides (2), Papua and New Guinea (8), Tahiti (3), Tonga (1), Trust Territory of the Pacific Islands (3), Wallis Islands (1), Western Samoa (2).

Also attending the Course were two guest trainees, one from the Northern Territory of Australia, and one from Uganda, Africa.

Naturally, each of the trainees had his (or her) own pre-conceived notions about what the Course would be like. Before they came to Noumea, they had been asked to indicate what they felt were important problems in their areas, and what they would like to get from the Course. Most trainees wanted technical information, especially about preventive medicine. Some wanted to learn new educational techniques or work with educational aids. Others sought solutions to their problems in working with the community. As a group, however, the trainees generally expected that the eight weeks that lay ahead would be filled with listening to lectures, copying notes, and taking examinations. As the trainees met one another before the start of the Course, the feeling could perhaps be best described as "going back to school again".

The staff which met to plan and conduct the Course recognised the tremendous task that was ahead of them. For one thing, the trainees would be of many different backgrounds, including a wide range of formal education and training, cultural and language differences. Most important, trainees were coming with different problems and interests. The staff took these factors into consideration and agreed that the Course should be conducted by methods which the trainees themselves could use in their work at home, and which would make the material of the Course most meaningful for them. Specifically it was recognized that the major task of the Course would involve changes in attitude and point of view among trainees, rather than merely passing on technical information or techniques. Hence, the methods of the Course must be those which are calculated to produce changes in attitudes.

It was felt that the traditional use of formal lectures, notes, and examinations would not provide trainees with the kind of experience which would help them to better understand health education and how it can form an aspect of the activities of all health workers and teachers. The staff strongly believed that health education is much more than merely teaching people about health in various ways. Instead they saw it as a basic approach in dealing with the people. It involves studying a community and its needs as a first step in the whole process of helping people to learn how to improve their personal health habits and attitudes, and to work together toward the improvement of health in the community.

Underlying this approach is the concept that health workers and teachers should work closely with the people to

understand their interests and needs and plan with them to solve problems. Of particular importance here is the concept that people learn better when responsibilities are given to them and when they are not forced to do things. Such was the agreed upon philosophy and aim of health education, which the staff wished to have trainees understand and form part of their own viewpoint.

In order to work toward the acceptance of this approach among trainees, it was decided to begin the Course in much the same way as one would begin this health education approach in the field, namely, by first considering the interests and needs of the people concerned. In this case it was the students themselves. Thus the students found that instead of beginning the Course by attending lectures on subjects that had been previously worked out in detail, they were asked to form into Problem Finding Groups. The task of these groups was to list what they felt to be important problems relating to health education. About 50 major problems were listed in this way. These were then consolidated into topic areas around which the material of the course was organised. Thus from the very beginning, the Course was built on the interests expressed by the entire group.

Basic Topics Of Course

The topics which in this way formed the basis of the course were as follows:

TOPIC I: *What are the common health needs and problems of village life?*

TOPIC II: *Who and what influences the health of the village?*

TOPIC III: *How people grow up in different communities.*

TOPIC IV: *How people learn and change their behaviour.*

TOPIC V: *Planning and organising*

SPC—WHO HEALTH EDUCATION TRAINING COURSE
TRAINEES

AMERICAN SAMOA
GALA, Fagaga M. District Supervisor of Education, Department of Education.
MULITAUAOPELE, Arieta (Mrs.). Chief of Public Health Nursing, Department of Public Health.
SAUPO, E. Ripine. Health Inspector, Department of Medical Services.

BRITISH SOLOMON ISLANDS
FAKAOMEA, William T. Assistant Medical Practitioner, Department of Health.

COOK ISLANDS
ATATOA, Maarateina. School Teacher, Education Department.
BROWN, Tamarua Tata (Mrs.). Junior Sister, National Women's Hospital, Cornwall Hospital.
ROBATI, Pupuke. Cook Islands Medical Practitioner, Health Department.

FIJI
NAQIRI, Siteri (Miss). Trained Nurse, Department of Medical Services.
SALATO, Esika Macu. Assistant Medical Practitioner, Department of Medical Services.

GUAM
GUERRERO, Olivia S. (Mrs.). Educational Supervisor, Department of Medical Services.
GUERRERO, Leon F. C. Sanitarian, Department of Medical Services.

NAURU
DORUBENANG, Frank. Assistant Health Inspector, Administration of Nauru.

NIUE
ERICK, Punapa. Assistant Health Inspector, Health Department.

NETHERLANDS NEW GUINEA
DROST, Johannes W. Teacher, ODO/ZNHK, Seroei.
JACOBS, Antonius M. Teacher, Apostolic Vicariate, Hollandia.

NEW CALEDONIA
GORODEY, Marc. Student Teacher, Teachers' Training College, Nouville.
WAMINIA, Henri. Asst. Nurse, Health Department, New Caledonia.
WIMIA, Felix. Nurse, Health Department, New Caledonia.
JORE, Rene. Technical Agent, Health Dept., New Caledonia.

NEW HEBRIDES
CLAVERT, Maxime. Nurse, Health Department, New Hebrides.
REVEAG, Stanley. Asst. Medical Practitioner, British National Medical Service.

N. TERRITORY OF AUSTRALIA
ROBERTS, Phillip. Native Medical Asst., Commonwealth Dept. of Health, Darwin.

PAPUA & NEW GUINEA
GANIGA, Hera. Health Assistant, Department of Public Health.
MOTU, Mary Solange (Miss). Nurse Assistant, Department of Public Health, Madang.
NAIME, Hildegarde (Miss). Nurse-in-Charge, Welfare Clinic, Hanuabada.
ROMNEY, Evertius. Native Teacher, Grade 3, Department of Education.
SUGOHO, Kahu. Asst. Medical Practitioner, Dept. of Public Health, Wewak, Sepik District.
TABUA, Cecilia (Miss). Assistant Teacher, Department of Education.
TAUREKA, Reuben. Assistant Medical Practitioner, Department of Public Health, Bwagaoisa, Misima, MBD.
TUROMORI, Tergog. Instructor, Aid Post Training Schools.

TAHITI
BAMBRIDGE, Benjamin. Chief Inspector, Institute of Medical Research, French Oceania.
DROLLET, Jacques. Teacher, Public Education Dept., French Oceania.
TROUILLET, Jean-Baptiste. Nurse, Health Department, French Oceania.

KINGDOM OF TONGA
FANAMANU, Siosifa A. Assistant Medical Practitioner, Department of Health.

TRUST TERRITORY OF THE PACIFIC ISLANDS
BILIMON, A. Lekmal. Japanese Medical Intern Trainee, Jaluit, Marshall Is.
ETMOL, Jesus B. Graduate Nurse, Yap Is., Caroline Islands.
VILLAGOMEZ, Jose T. Medical Practitioner, U.S. Naval Administration Unit, Saipan, Marianas Islands.

UGANDA
BAGENDA, Sengendo. Medical Assistant, Medical Department.

WALLIS IS.
LAGIKULA, Kamaliele M. Nurse, Dispensary, Mua.

WESTERN SAMOA
FAAI'UASO, Tapeni T. Asst. Medical Practitioner, Health Department.
SUNIULA, Vaasa (Miss). District Health Nurse, Health Department.

COURSE STAFF MEMBERS

BROWN, Morven S. (Dr.). Professor of Sociology, Head of the School of Humanities and Social Sciences, N.S.W. University of Technology.*
CARPIO, Gavino M. Director of the Division of Health Education of the City of Manila, Philippines.
COOL, John C. Director of Local Government and Development Officer, Pago Pago, American Samoa.
COWPER, Lawrence T. Chief, Sanitation Section, Guam.
KEYES, Lynford L. Regional Adviser for Health Education of the Public, Western Pacific Regional Office of the World Health Organization, Manila, Philippines.
LONIE, Thomas C. (Dr.). Research Officer for Health, South Pacific Commission, Noumea, New Caledonia.
MASSAL, Emile (Dr.). Executive Officer for Health, South Pacific Commission, Noumea, New Caledonia.
McQUALTER, John R. Inspector of Schools in the New South Wales Department of Education and Acting Head of the Audio-Visual Aids Branch of the Department, Sydney.
ROBERTS, Bruce. Organizer for Island Literature, Literature Bureau, South Pacific Commission, Sydney.
SCHERZER, Alfred L. (Dr.). International Health Education Specialist, South Pacific Commission, Noumea, New Caledonia.
SEDDON, Richard (Dr.). Executive Officer for Social Development, South Pacific Commission, Noumea, New Caledonia.

* Dr. Brown was Director of the Course.

The eight women trainees who attended the Course. Front row (left to right): Miss Mary Solange Motu (Papua & New Guinea), Mrs. Olivia S. Guerrero (Guam), Miss Hildegarde Naime (Papua & New Guinea). Back row (left to right): Mrs. Tamarua Tata Brown (Cook Islands), Miss Siteri Naqiri (Fiji), Mrs. Arieta Mulitauaopele (American Samoa), Miss Vaasa Suniula (Western Samoa), Miss Cecilia Tabua (Papua & New Guinea).

RIGHT: On the closing day. The Secretary-General of the South Pacific Commission, Dr. Ralph Clairon Bedell, presents Course certificates to Miss Vaasa Suniula, a district health nurse from Western Samoa, and Mr. Siosifa A. Fanamanu, an assistant medical practitioner from Tonga.

health education programmes and activities.

TOPIC VI: *The use of health education methods and techniques.*

When the topics had been agreed upon, the entire group of trainees were divided into four General Study Groups, in each of which the various professions and territories were represented. The sole exception was made in the case of the few students who spoke only French. These were placed in one study group for convenience of translation. These study groups then became a principal means through which the material of the Course unfolded.

Each new topic was introduced to the entire group of trainees in what was called a "plenary" session, either as a lecture presentation or panel discussion. Then followed a full morning each day for several days devoted to discussion of the topic in the four General Study Groups. Before going on to the next topic there would again be a final "plenary" session at which the discussion of the preceding days would be reported back. General summary and conclusions by the entire student group would be the principal function of the final topic "plenary" sessions.

"Plenary" sessions provided an opportunity for utilizing a variety of educational techniques. The use of "buzz-groups" for example, was common. These are small groups of from 6-10 people which spontaneously form from the total "plenary" group to discuss some point for a short period and then, in turn, report back on their conclusions. "Role-playing", too, was popular. This is a technique in which members of the group act out roles of a situation in order to illustrate some point and stimulate discussion. In these ways, the discussions of each topic were clarified and summarized.

The Problem Finding Groups which met at the beginning of the course also uncovered a number of technical areas which were of special interest to some students. In order to provide an opportunity for trainees to pursue these special interests, Interest Groups were formed around the following topics: *Maternal and Child Health and Nutrition; School Health; Environmental Sanitation.* The work of these Interest Groups was flexible. Some of them even prepared various appropriate educational aids.

Special Role Of Staff

The role of the staff in the work of the groups and in class presentations deserves special mention. The staff saw themselves as providing guidance and direction to the Course, being at the same time "resource" people. But most important, they were in every sense equal group members with the trainees—sharing and exchanging ideas, learning from each other. It is interesting to note that an outsider observing these work groups in action would have a difficult time distinguishing between teaching staff and students! This friendly and close relationship was maintained as well when trainees individually met with their staff advisers to talk over various problems.

Since the Course was held at the headquarters of the South Pacific Commission, there was ample opportunity of using its many facilities. Special lectures were given by South Pacific Commission staff members; workshops were organized for study and preparation of audio-visual and other educational aids; field trips were conducted to institutions and field situations of interest.

Student planning groups played an important part in the course soon after the General Study Groups had been organized. A joint student-staff Planning Committee was set up to be responsible for planning the actual day-by-day schedule of the course. The Programme Committee also planned the plenary sessions, interest groups, workshops, lectures, etc. Similarly, the student Recreation Committee organized social functions such as dances, and a team volleyball competition. In these ways, again, the students were playing a major part in planning for their own interests and

(Continued on page 55)

Should Mechanization Be The Aim Of All Planters?

In some Pacific territories, terrain and other factors are suited to mechanization of agriculture; in others they are not. The pros and cons of field and factory mechanization of plantations are discussed in this article by a leading Pacific authority on the subject.

By D. R. A. EDEN*

A disc plough drawn by a diesel crawler tractor being used in the Naduri area of the Sigatoka Valley, Fiji.

THE thought of running any tropical farm on push-button lines must appeal to the least imaginative planter. To those whose properties lie in territories where a constant struggle to obtain an adequate labour force has become a problem of the first magnitude, the idea of being able to operate mechanically with fewer employees is likely to be judged worthy of consideration.

The use of machinery in tropical agriculture has not been brought about entirely as a result of labour scarcity. Careful accounting methods have proved that a machine in the right place, despite its original price, considerably reduces costs of production, even after full allowance has been made for heavy tropical depreciation.

The object of plantation mechanization is to conserve manpower by substituting machines capable of doing similar work more satisfactorily and more quickly, thereby reducing operating costs.

No agricultural industry, however mechanized, can function without labour, but it has been proved conclusively that the number of unskilled workmen employed can be reduced by advanced production methods.

The Colonial Sugar Refining Company's sugar estates in Fiji and their refineries are probably as fully mechanized as possible, but they still give employment, indirectly to many workers who grow cane on the farms, and directly to a small army of technicians for servicing the factory plant and machinery.

In judging whether mechanization is effective, it is advisable to find out what is being done on the large company-owned estates. Generally speaking, with shareholders' dividends always in mind, these interests are first to give trial to new techniques which give promise of higher production or lower operating costs. These methods are frequently evolved from theories tested in agricultural experimental stations.

If new methods of mechanization are given trial and retained in a company's organization, it is fairly safe to assume that they must be successful, and consideration can then be given as to whether they are applicable to smaller estates.

Successful Examples of Mechanization

Let me briefly review a few examples of mechanization which I have seen used successfully on some of the large up-to-date company properties, and indeed on some privately-owned plantations.

The bull-dozer or the angle-dozer is now being used extensively to clear jungle, to rehabilitate old and abandoned estates by the complete removal of old growth, and for levelling off, as far as is practicable, the new areas to be planted.

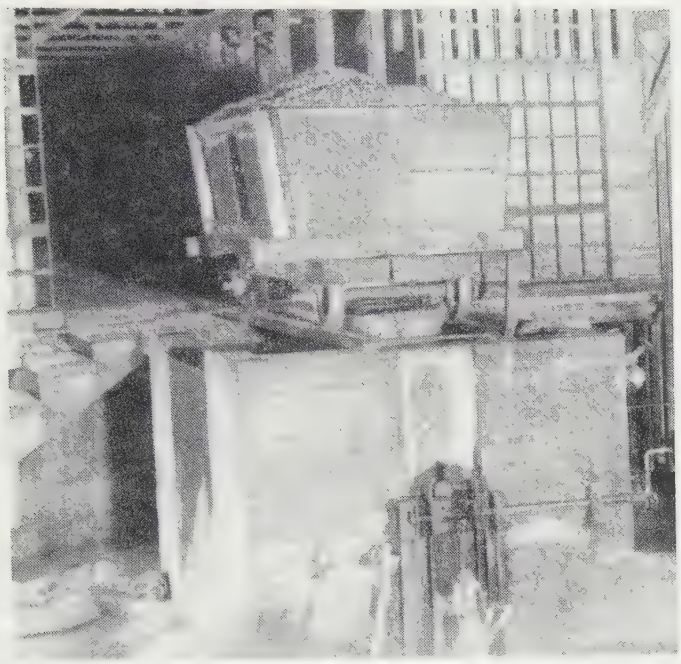
The more specialized angle-dozer is useful in the formation of road cambers and drainage ditches. Its blade can be set to an angle and the machine used as a heavy grader.

On some of the new cocoa and coffee estates where the 'dozers have been used to level the new areas to be planted, tree legumes have been planted in the same lines as the coffee or the cocoa. Grass tracks on either side of the lines run smoothly like strips of lawn. Motor mowers, drawn by jeeps or light rubber-wheeled tractors, mow down the grass and weeds on the multiple tracks between lines of coffee or cocoa and maintain the blocks in park-like condition at a fraction of the old cost of cutlassing by hand.

The grass roads permit the passage of trucks at harvest time except in heavy rains, when they are diverted to the more limited number of metal-surfaced, all-weather roads. The multiple tracks, too, ease the use of tractor-drawn power sprayers and chemical fog-making machines, together with other equipment for the control of pests and diseases.

Some estates which regularly cultivate between the lines, use jeep or tractor-drawn multiple disc ploughs and cultivators. On these plantations, machines for the application of fertilizers are used as in agriculture in temperate zones. Speed of application and elimination of waste has endorsed their performance and lowered costs. I understand that

* Mr. Eden was General Manager of the New Zealand Reparation Estates in Western Samoa from 1935 until his retirement last year.



A truck load of fermented cocoa in a Western Samoa Trust Estates Corporation factory. The cocoa will pass through a sliding trap in the bottom of the truck to the mechanical washer below. An example in the use of hillside factory planning. Right: McKinnon three-ton rotary machine and drier used in the Tafaigata factory of the Western Samoa Trust Estates Corporation.

they may be adapted for use through the grassed tracks, by throwing the fertilizer mixture on either side along lines of cocoa, coffee or even coconuts.

On many coconut plantations the transport of copra to the driers is no longer done on the backs of coolies, or coconuts hauled to cutting sheds by lumbering ox-cart. Trucks with high, slatted sides haul great loads of coconuts or freshly-cut copra along good roads, the latter often maintained with road graders.

Still in the future—at least for the Pacific—to accelerate the laborious handling of coconuts, are mechanical nut collectors, now used to some extent on plantations in south-east Asia, where cultivated land between the rows of coconut palms permits the use of the machine.

Some of the nut-collecting machines are self-propelled. They rake the fallen nuts into a belly-like structure, reminiscent of the giant road-making carry-alls, and dump their collections by the roadsides, or even transport them directly to cutting sheds or driers. In the former case, where trucks pick up the dumped nuts from the roadside, mechanical elevators attached to the truck's side minimize the number of labourers used and reduce the loading time of the vehicle.

The nut-collecting machines could not be used on stony ground, or over land which has not been smoothed out by plough and harrow or by bull-dozer. They are most effective operating on an area under frequent cultivation. They would not perform well on properties where legume cover crops, such as pueraria and centrosema, are grown; the contrivance would pick up more vines than coconuts.

In the processing plants, machinery is now in vogue on all up-to-date plantations producing cocoa, coffee or copra.

Pulpers, hullers, huskers, rotary driers and graders turn by mechanical power in the coffee mills; washing machines, elevators, rotary driers and graders mechanically standardize the product in cocoa factories; on the coconut plantations machine driers with automatically-controlled heat, produce premium-graded hot-air-dried copra for shipment overseas.

Hillside sites are selected wherever possible for modern processing plants. As a labour-saving device, the sloping land provides for gravity-fed transmission of products as they pass from stage to stage. If hillsides are not available, then mechanically-operated elevators are used to convey the product into hoppers; its further distribution, as upon a hillside, is then controlled by gravity and fed by shute to fermenting boxes, pulpers or to whatever machines comprise the next stage in the product's passage through the factory.

Providing skilled operators are used, products which have been processed by machinery are characteristically even in appearance and grade, as against the almost daily variations in quality in the out-turn from primitive equipment.

In the open market, buyers seek the brands with which they are familiar, and a continuing evenness in quality of shipments is an essential factor in maintaining demand.

Many of the factory-placed machines which I have mentioned have been used for many years throughout the Pacific and are now considered part of routine production procedure. Nor has their use been confined only to large estates.

It is noteworthy, however, that even upon the largest estates, many forms of field mechanization have lagged in use, because the traction of mechanized units depends so much upon the provision of an adequate number of access tracks or roads. In some territories very few moderate-sized private holdings can boast more than one road on the estate.

Writing in *Economic Aspects of the Coconut Industry in the South Pacific* (S.P.C. Technical Paper No. 92), E. J. E. Lefort quotes some interesting figures —in support of plentiful internal roads. He states, inter alia:

> "In Africa, by establishing carriage tracks every two rows and enabling planters to make use of modern techniques, it has been found possible to reduce the labour required for establishment work on the plantations by 60% and for maintenance work by 30%. Production costs per hectare are reduced by 20% despite increased outlay for purchase of extra equipment."

Notwithstanding the foregoing, the extent to which plantation field mechanization can be applied in the Pacific depends upon the type of soil and terrain found where the plantation is situated.

Mechanization of agriculture in some Pacific territories is creating an ever-growing demand for motor mechanics. Here a group of trainees are being instructed in engine maintenance at the Idubada Technical Training School at Port Moresby.

On atoll islands like those found in the Gilbert and Ellice Group, the Cook Islands and some in the Tahiti Group, there is little soil to speak of, but mostly sand and coral. Even native root crops cannot always be grown unless the islanders use artificial compost cleverly held around the plant roots with basketwork. Although coconuts thrive on coral atolls, any form of field mechanization among the planted areas could scarcely be considered.

On other islands of high volcanic land such as Samoa, fertile disintegrated lava soil lies pocketed among vast outcroppings of broken lava flows, and countless surface stones prevent the use of any form of agricultural implements.

On coral limestone islands like Niue, to level plantation land with a bulldozer would be to invite disaster. When the first dusting of loam had been scratched from the surface, only pure coral limestone would be left. Nevertheless, bananas and sweet potatoes are grown in soil pockets there, and exported from the island in substantial quantities. Any mechanization, apart from transport, could scarcely be undertaken.

The removal of surface soil by bulldozers, too, is often contra-indicated where shallow surface soil and underlying stratas of indifferent material would necessitate expensive soil rehabilitation after levelling. For the planter who may be engaged in establishing his property without expert advice upon this subject, the substitution of plough for bull-dozer on arable land is most advisable. In the case of virgin jungle soil, the loss of natural surface compost in levelling by bull-dozing operations would be both wasteful and uneconomical.

Native planters with very small holdings of arable land within a reasonable distance from similar neighbouring estates may combine co-operatively to use machinery for establishment purposes, and for maintenance work.

Such a scheme would have to be carefully managed on company lines by a competent person. Upon the fair allocation of the equipment's working time and the sound maintenance of the machinery would depend the success of the venture.

Artificially-levelled land or the construction of roads every two rows are not essential for the husbandry of any tropical crop, but if field mechanization embracing such improvements as power sprayers, motor mowers, fertilizer-spreading machines, etc., are to be considered collectively with motor transport and haulage, then the pre-requisite is access between the rows.

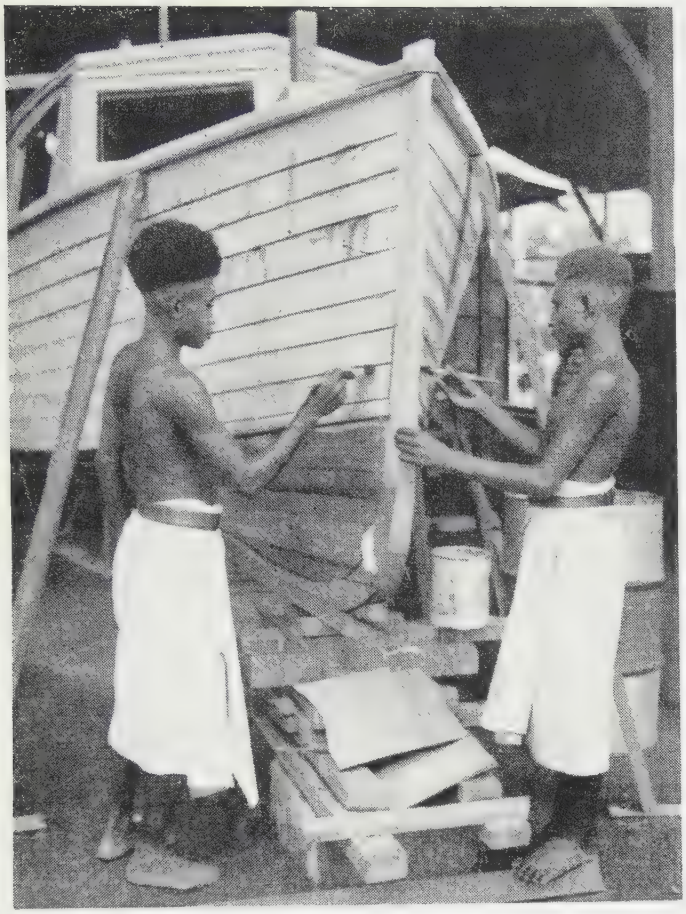
With cleared arable land available, the establishment of a plantation can be accomplished with a tractor and multiple disc plough at lower costs than the same area on a farm in a temperate zone, since equivalent labour costs are lower in the tropics.

The addition of a cultivator would be helpful in keeping the land under cultivation between the rows, while the further addition of a trailer would provide for the transport of supplies, labourers and produce. As production increased, the planter could consider the more specialized machinery as required.

Many of the Pacific islanders now-a-days have planted areas ranging in size from a few acres to many hundreds of acres. On these properties the employment of labourers from within the family framework and without monetary consideration, is not conducive to their

(Continued on page 54)

Collecting coconuts in Western Samoa. A donkey with panniers full of nuts delivers them to a waiting cart. These bullock-drawn vehicles are now being superseded by mechanized transport.



Above: Papuans painting a launch hull. Right: In the Gulf Country west of Port Moresby more than fifty co-operatives are functioning, copra marketing being their mainstay. In two years they saved the £8000 necessary to build their own ship, the Toaripi, shown here alongside the wharf at Port Moresby.

Building Small Ships For Pacific Waters

Some thoughts on the construction of small ships for service in Pacific waters, and on their maintenance under tropical conditions, are recorded in this article by . . .

ARTHUR N. SWINFIELD*

IN the heyday of wooden ship construction in Australia, many beautiful and useful craft found their way to the various islands of the Pacific, and those that avoided the perils of reef and storm lived to serve for even as long as some sixty years. One cannot help but wonder why the "old timers" wore so well—and why many of the more recent vessels appear to give so much trouble.

The majority of these earlier vessels were originally sailing craft, though many became "auxiliary" with the advent of the internal combustion engine. The various ills of the sailing vessels were confined mainly to timber, fastenings and canvas—but with the installation of engines and auxiliary equipment another batch of troubles appeared to worry the owners and operators of these craft, and so one sometimes hears the opinion that ships were a very different proposition before engines took over from the sails. Perhaps to some extent this is true—but it must be remembered that when ships used sail, economic conditions were much kinder, and the shipwright was a master in the art of wood-working, from "the keel to the truck".

Quite a different story exists today. Long lengths of select timber and select species are becoming more and more difficult, and certainly more expensive, to obtain, so that the tendency is to use substitute species of doubtful quality and minimum dimensions.

Ordinary non-ferrous fastenings do not appear to be to 'old time' standards, while galvanised iron is a thing of the past, having being replaced by galvanised mild steel.

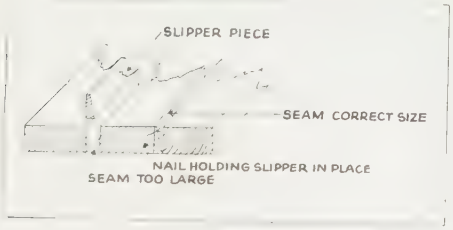
Metal sheathing no longer appears to have the life of earlier sheathing—one rarely hears of metal sheathing being re-rolled and used again after a grounding, as it so often was in years gone by.

* Mr. Swinfield is an Australian naval architect. His services were made available by the Food and Agriculture Organization as a lecturer on boat building and marine engines at the recent SPC Fisheries Training Course.

A class in boat construction and maintenance being conducted by the author during the recent Fisheries Training Course for Pacific islanders held at headquarters of the South Pacific Commission at Noumea.

Shipwrights A Vanishing Race

Shipwrights in the real sense are a vanishing race. Although one hears of the adze and axe, of the virtues of solid-framed vessels and the dovetailing of frame heels into keels, and so on — actual demonstrations of these once-common skills are few and far between.

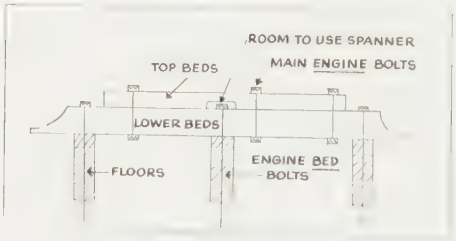


Tightening over-size caulking seams.

So instead of the really first-class vessels of years ago we find a different type taking over the island trade; different in the respect that the trend is towards the derating of quality. For this reason it is suggested that maintenance should be more carefully attended to, and the designer and builder should bear such maintenance in mind when producing a vessel for the islands.

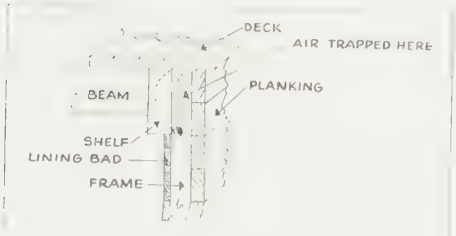
Copper fastenings appear to be a 'must' for the islands, and copper sheathing is just as important. This question of sheathing is a very awkward one, as Muntz metal, copper, and naval brass have for years been the main sheathings used. There seems to be no doubt that sheathings in general are not as long-lasting as they were years ago; the author is of the opinion that arsenical copper is perhaps the most effective of any today.

If galvanized fastenings are used at all they should be well countersunk and properly dowelled, or 'stopped'. Ordinary putty or 'stopping' is now being superseded by many adhesives or filling compounds, but in the case of caulked decks and planking seams one should still be very careful, as good quality marine glue (properly melted and poured) for deck seams, and whiting mixed with good quality gloss (topside) paint for hull seams, are still hard to beat. Speaking of deck and hull seams, there is often a sad lack of knowledge regarding caulking and puttying (paying). Leaking deck seams invariably lead to dry rot once rain water begins to seep inside the hull.



Bolting of engine beds.

Caulking should be kept tight—and if seams are unduly wide and parallel in depth they should be rectified with appropriate strips of timber fitted in the seams and fastened to the plank edge here and there. Once this is done, caulking seams become 'caulkable' and so watertight.

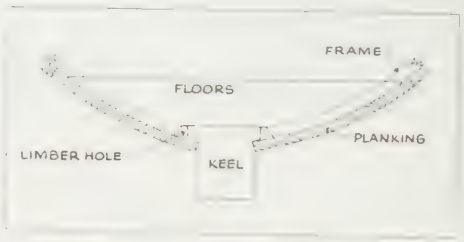


Close lining leads to dry rot.

The Dangers Of Dry Rot

With regard to dry rot, the owner should always realize that fresh water provides the breeding ground for so-called 'dry-rot', and that decks or topsides should never be washed down with fresh water at any time.

It is most imperative that all overlapping joints be given at least one coat of paint before being finally fastened in position; this applies particularly if plywood is used in construction. This procedure is so often specified, and then ignored during construction. Where two surfaces of timber are placed face together (particularly in humid tropic conditions) condensation and capillary attraction holds moisture between the surfaces, and dry rot soon shows up. This applies only where salt water does not contact the timber in question. However, if the contacting surfaces are painted before being fastened together the risk of dry rot is so much less.



Installation of limber holes.

Adequate ventilation throughout the vessel is also imperative, for dry rot and rust flourish in a badly-ventilated ship. The most common location of dry rot due to lack of ventilation is aft in a counter-sterned vessel, insulated spaces, lockers under galley sink, and at the ship's side where deck beams are dovetailed into the shelf so that the underside of the deck comes flush with the top of the shelf. This latter point is even more evident if the vessel is lined close up to the bottom of the shelf. To ensure good ventilation, always remember that air must be led into *and out* of any enclosed space—preferable in at a low level—and out close up to the deck.

Another danger point occurs in the way of toilets and wash places. Nothing seems to affect timber or steel so badly as urine or soapy water. Do not be misled by the fact that such spaces

The people of the Trobriand Islands are expert canoe builders, and like other Pacific islanders would no doubt be quick to learn modern methods of building small ships. Left: The hollowed-out log forming the canoe hull is built up with planks to give adequate freeboard. Outrigger and platform are added later. Right: The larger canoes have vertical prow-boards at either end, expertly carved in elaborate designs.

are often lead-lined. If such lead-lining becomes cracked or holed in even a minor degree, the subsequent leak will cause dry rot to develop under the lead-lining. The same thing occurs under tiled work, so that one is led to believe that the deck should be left scrubbed clean or even painted. Linings can prove dangerous.

The practice of fastening chain plates direct on to the planking very often leads to the inevitable rust mark and consequent deterioration of the planking in the way of the chain plates. The author suggests that it is good practice to place a gasket of ship's felt between the chain plate and the hull; paint the inside face of the chain plate and then fasten with 'through' screw bolts.

So much for any "minor" items. Now perhaps it would be well to pay some attention to constructional design when engines come into the scheme of things.

A very common complaint in motor-driven vessels seems to be loose engine beds, with subsequent loose through-bolts, and leaks. All engine beds should be through-bolted with screwed bolts, and such bolts should be fitted with heavy flat washers. The outside washer should be "grommeted" with either oakum or cotton wick, and the *inside nut* should be *accessible* for future tightening as required. The main engine bolts should never go right through the hull; rather should they be taken through the longitudinal bed, with a nut top and bottom.

Stern tube flanges also seem to have a habit of leaking, due to bad fitting or even worse fastening. Flanges should always fit true and tight onto the face of the deadwood and the shaft log—but even then they must be held in this position by means of good fastenings. Ordinary lag screws (or lag bolts) are passably good in edge-grained timber, but when end-grained timber (such as in the end of a shaft log) has to take a flange bolt—then an ordinary lag screw or lag bolt can be effectively replaced with an ordinary Whitworth-threaded bolt. Bore for such a bolt with diameter of hole equal to diameter of bolt at root of the thread.

Skin fittings should always be taken through the hull and an inside pad or backing piece. The backing piece should always overlap two or more planks and be through-fastened to the hull with copper nails. Exhaust pipes should preferably be taken dry to the atmosphere by means of a funnel (housing the muffler and exhaust pipe), rather than wet and over the side or through the stern.

Fresh-water cooling is most desirable in any water-cooled engine, obviating as

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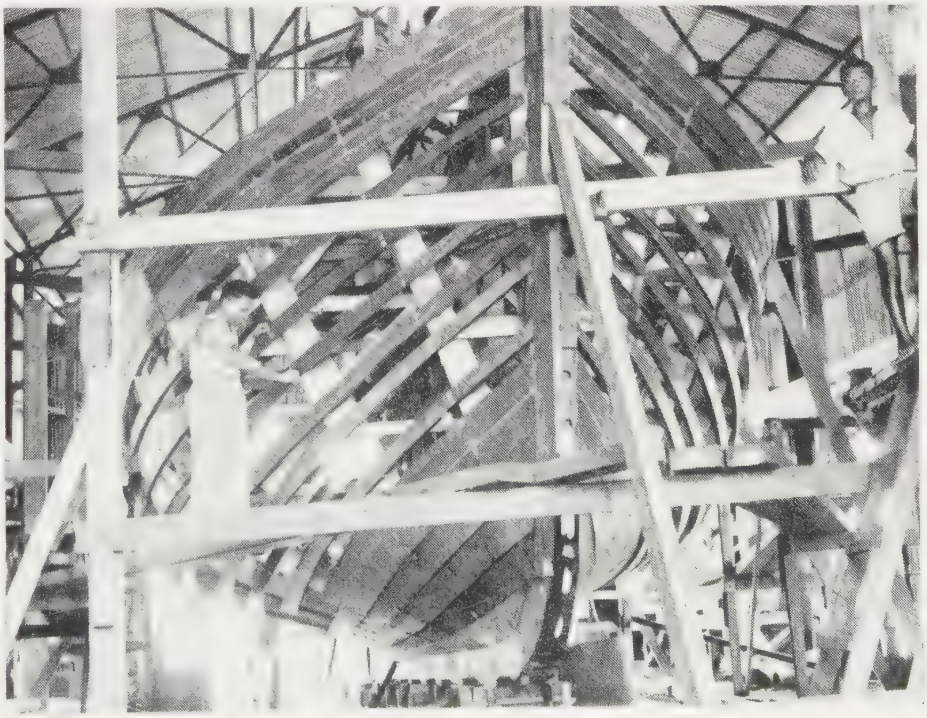


The hull of a large work-boat being built at the Public Works boatshed at Suva.

PROSPECTS ARE BRIGHT FOR . . .

Tourism In The Pacific

With four major airlines in keen competition, trans-Pacific air services are expanding rapidly, while shipping companies are also stepping up their trans-Pacific sailings. Vigorously fostered, the tourist industry in the Pacific could quickly expand to become a new major source of income to many Pacific territories.

By R. HOWLETT

Executive Secretary, Fiji Visitors' Bureau, Fiji Islands

THE emergence of the South Sea islands from the tranquil backwater of isolation has been accentuated vividly in the past decade through the expansion of air and sea services across the wide Pacific. Islands and island groups that were but unique names spattered over the broad expanse of this great ocean now emerge as real places. Reefs and atolls, islands and mountains, villages and cities, palm trees and people are no longer myths from the pages of Stevenson or Melville. The modern miracle of transportation has changed all that.

The growth of travel in the South Pacific has been rapid. The provision of the means of transport from place to place induces the traveller to utilize those facilities, and the use of these by the traveller induces the provision of more facilities. It is as simple as that. But the flow must be kept moving, and economically, growing, if the fullest use of available facilities is to be made.

The inducement to travel in the South Pacific is already there. The pages of history have wrapped an allure of romance and simplicity around these isles and there is an indefinable attraction in the very name, the South Sea islands. But until recently, the means of getting to the South Pacific were few. There has been a trans-Pacific sea service since the turn of the century serving the American west coast and the countries of New Zealand and Australia, but the numbers carried were comparatively small. However, within the last ten years the additional facility of air travel has been added and now for the traveller with limited time available a great new field has unfolded.

The demand for travel has seen four major airlines enter the South Pacific in keen competition for the growing market, and where there is healthy competition so lies better and more efficient service. Today some thirty giant airliners touch down at Nadi each week. Passenger loadings have shown a steady fifteen per cent increase over the past five years, and it is reasonable to assume that this rate will jump even higher in the next year or two as the jet age spreads its influence in the Pacific.

The growth of shipping along the same routes has been astounding and the introduction of surface facilities during the past five years has engendered an entirely new field of traffic. The steady increase in air passages has been maintained, but when the Orient Company entered the field, a jump of eight thousand passengers a year resulted. These passengers were induced to travel through their preference for the sea and it is probable that if the sea passages were not available a great majority of this group would not have travelled.

This theory is borne out to some extent by the experience of the Matson Company who introduced their new liners *Monterey* and *Mariposa* on the South Pacific run late in 1955. These vessels carry a preponderance of round trippers from the west coast of the United States to the Antipodes along a varying route, and this service also is finding a great deal of new business from people who would not bother to travel if surface transport was not available.

How has this great expansion of travel facilities affected the areas concerned? There are many and varying factors to be considered, and their value is determined in the light of the viewer.

Firstly, the simple fact is that the world is on the move. The great strides made in recent transport facilities has shrunken the isolation of yeterday to the back-door neighbourliness of today. Where once the man with a fortnight's vacation looked at railroad timetables for a hundred-mile jaunt, he now looks at airline schedules for a ten-thousand-mile ride. And so with this ready availability of travel to distant places, more and more people are getting out of their

Guests staying at the Korolevu Beach Hotel in Fiji greatly enjoy living in these cool and comfortable thatched native style bures. This picturesque and successful way of avoiding the high capital outlay involved in the building of modern European-style hotels could with advantage be copied in other Pacific islands planning to develop their tourist trade.

own backyard to see the other fellow's country.

That this is a desirable trend is evidenced in the better understanding of each other that follows a personal meeting, the better understanding of the problems confronting the other fellow's country, and a resultant desire to condemn less than to praise. The exchange of peoples is a vital factor in the peace of the world, and travel is the vital factor in that exchange.

Seasonal Influences Affect Travel

Secondly, the South Pacific is fortunate in its geographical location. Spread over a quarter of the whole Pacific, it is bordered on the east by the Americas and on the west by New Zealand and Australia. The significance of this location is that the seasonal influences of winter and summer affect travel to a very great degree. In winter the cold climate dweller looks to the warm fine climates of the tropics. In the summer he is more inclined to find his pleasure at resorts nearer home.

Thus, in Fiji, for example, there is an influx of New Zealand and Australian visitors in the winter months of May through October, and then the flow falls away as their summer comes along. However, in the months December through April, there is an influx of American and Canadian visitors as they too escape their winter months, and this trend of travel to the South Pacific is growing rapidly.

A field capable of great expansion is the American travel market. The American is an inveterate traveller and never more so than in the past decade. For several years he has visited countries of easy access. He has taken in Europe on one vacation, South America on another, Japan and the Far East on yet another, Canada, Mexico, the Bahamas, are all familiar grounds for him. Sooner or later the problem arises—where is somewhere new to visit? And that is where the South Pacific is coming in to its own. As a greater awareness of the facilities of transportation and accommodation become known, so does the desire to visit us become more concrete.

Tourist Travel A Valuable Invisible Export

How does the tourist trade affect the economy of this great area? Or perhaps it should be, how could the tourist trade make its impact? The travel industry is as much an industry in effect as that of the sugar, gold, and copra industries of this area. It is an invisible export and earns foreign exchange for each country in just the same manner as the sale of produce abroad does for the producing country. But the weight on the scale in favour of the development of the tourist industry is that it requires only nominal capital and perhaps the least use of available manpower than in any other industry capable of earning income on a comparable basis.

The basic requirements are accommodation and transport services.

For these, the tourist spends a required amount daily. He must have a roof over his head, he must eat, and he must get

Taste and ingenuity have been cleverly combined in the decoration of the dining room of the Korolevu Beach Hotel. The panelling is bamboo, while the tapestry is Fijian masi, the tapa cloth of the Pacific.

FIJI'S TOURIST DEVELOPMENT, 1952-56

Year	Transients				Visitors		Visitors		Total Intake	
	By Sea		*By Air*		*(3-7 days)*		*(8 days-4 mths.)*			
	No.	*Amount Spent*	*No.*	*Amount Spent*	*No.*	*Amount Spent*	*No.*	*Amount Spent*	*No.*	*Amount Spent*
1952	5,248	£10,496	14,359	£21,538	3,358	£70,518	2,247	£89,880	25,212	£212,432
1953	5,352	£10,704	14,121	£21,182	3,589	£75,369	2,946	£117,840	26,008	£225,095
1954	12,298	£36,894	15,805	£23,707	3,294	£102,232	3,205	£176,275	34.602	£339,108
1955	15,594	£46,782	17,822	£26,733	4,355	£152,425	3,414	£187,770	41,185	£413,710
1956	14.094	£42,282	26,527	£39,790	5,389	£188,615	3,950	£256,750	49,960	£527,437

Apart from the above listings, a fifth category, comprising visitors on cruise vessels in the years 1952-56 numbered 17,866. They spent an estimated £212,995 in that period.

around from place to place. In addition he can, but does not necessarily do so, spend additional money on non-essentials such as clothing, souvenirs, tips, drinks, cigarettes and tobacco, photography, haircuts, stamps, cables, postcards, and the dozen and one other items that attract at the time.

In Fiji, the Fiji Visitors Bureau has made a close study of the spending habits of the tourist and from the known expenses plus an estimated minimum value for the intangibles it is possible to place a definite value on our tourist income. This income, in effect, is spread over the whole community, sometimes directly to one section, but always indirectly to every resident.

The Fiji Visitors Bureau estimates that out of every £1 spent by a tourist in the Colony, sixty per cent stays in the Colony in return for services provided, and that 40 per cent is returned overseas to purchase replacements of expendables used by the visitor, i.e., liquors, tobaccos, cloth, petrol, tyres, imported foods, etc., etc. The direct gain in the latter group is made by Government with a blanket tax on imports through its Customs and Excise Department. Other immediate beneficiaries are the importer who handles the replacements, the operator handling the direct sale to the tourist, the shipping and goods handling companies who move the goods around, and so on. Each of these in turn pays tax to the Government, and part of that tax is earned out of tourist money. The list can go into infinity as the effect of the tourist £ is traced to the end.

In Hawaii, the Hawaii Visitors Bureau estimates that each tourist dollar is turned over seven times in its handling from the time the visitor spends it until it ends up in the Government coffers. And that is probably true in its application to the South Pacific travel trade.

The end effect of travel expenditure is that it benefits both the Government and the people.

Steady Increase In Tourists To Fiji

The expansion of tourism in the South Pacific has not been accurately recorded by many of the countries involved, but the Fiji Visitors Bureau has maintained a statistical report annually for the past five years. A perusal of this will show the rapid increase in visitor intake annually.

The Immigration Department of the Fiji Police Forces keeps complete monthly records of all persons landing in the Colony. They are divided into several categories—returning residents or persons coming to live permanently; transient passengers on ship and plane; visitors spending between three days and seven days; and visitors spending more than seven days and less than four months, the maximum any visitor can stay in Fiji.

Through personal questioning and enquiring from banks, hotels, taxi companies, souvenir stores, and the travel agencies it has been estimated that the transient by sea spends a minimum of £3, the transient by air, £1 10s., the visitors staying between three and seven days spends a minimum of £35, and the visitor in the last category spends a minimum of £65.

With the accurate check by the Immigration Department and the known minimum amount spent by each group, it is possible to give a firm evaluation of the worth of the travel industry and its place in the economic development of the Colony. This breakdown shows graphically the pattern of increase in Fiji. It is probable that the basic increases could be applied to all territories served with adequate transportation facilities.

Prospects For The Future

What of the future? The diverse products of the South Seas are in effect the most stable form of income, and employ the greatest number of people in their preparation. But while their productive stability may not be questioned their marketable values may.

The primary exports from the Fijis, for instance, are sugar, copra and coconut oil, and gold. Each of these major industries has problems. Sugar is sold on a controlled market that could disintegrate should Cuba, one of the world's largest sugar producers, decide to expand its production. This, I understand, is being held in check through agreement with the United States. Should Cuban sugar flood the world market, the resulting fall in price would be of serious concern to Fiji. Copra, formerly bought under a ten-year agreement with the Ministry of Food in the United Kingdom, now comes on to the open market at the end of this year. It is anticipated that a fall of possible £400,000 will occur in the present income from copra and coconut oil. That, if it eventuates, will be of serious consequence to the Colony. Gold is a wasting industry, in that what is taken from the ground cannot be replaced, and therefore there is a point-of-no-return in gold mining, unless new and payable fields are discovered.

However, with the tourist industry, none of the above factors affect development. Providing there is average world prosperity the tourist industry prospers. A fall in the price of one product does not affect the overall picture, and it is reasonable to assume that the future is bright for tourism.

The expansion of tourism in the South Pacific is affected primarily by the alarming lack of accommodation and the need for provision of adequate facilities for visitors. Each territory is faced with this same problem and unless prompt and efficient steps are taken the present difficult situation will develop into chaos inside the next three years.

What we have to realize is that the jet age is on us. Not in ten years time, nor even five, but right now. Next April Canadian Pacific Air Lines introduce giant Britannia turbo-jets on the South Pacific run. Ten months later Qantas switch over to Boeing 707's, and a few months after this Pan American World

(Continued on page 57)

Clump of solanum torvum being sprayed with a hormone preparation using a knapsack sprayer. This weed may be controlled by 2,4-D, 2,4,5-T, "Trioxone" or "Tritox", at $\frac{1}{4}$ gallon per acre in a suitable volume of fresh water.

Right: "Micron" sprayer, marketed by Messrs. Clean Crops Ltd., which may be used for blast spraying, obtaining uniform coverage with as little as $2\frac{1}{2}$ gallons of spray per acre.

Weed-Killing by Chemicals In Tropical Crops

UNDER the title *Practical Aspects Of Weed-killing By Chemicals In Tropical Crops*, a report by Mr. E. J. E. Lefort, Research Officer for Economic Development, South Pacific Commission, was distributed early in 1956. The enthusiastic reception given to this report at all agricultural levels in the South Pacific led the Commission to undertake its publication as Technical Paper No. 108.

In all tropical countries, the luxuriance of the vegetation, frequently combined with a shortage of man power, favours overgrowth of plantations with weeds. In such conditions removal of these harmful plants, whether they be grasses, shrubs or trees, always presents considerable difficulties. This is particularly so in South Pacific territories, where the last war was further responsible for neglect of crops.

It is known that many planters in the area are both alarmed and defenceless in face of the invasion of their coconut, coffee and cocoa plantations by weeds. Since hand clearance is often too expensive, they are obliged to fall back on chemical weed-killers, but they use these with considerable caution through lack of basic knowledge which is available only from very diverse sources.

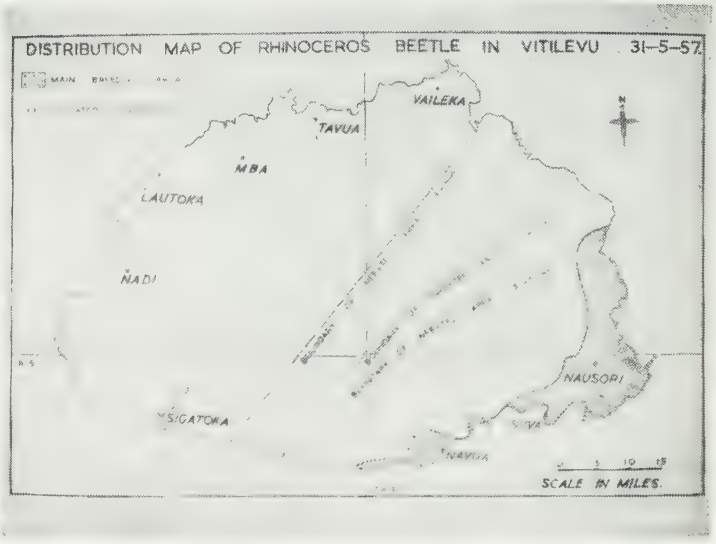
The aim of the author was, therefore, to make a practical summary of the general data on herbicides and their uses. Mr. Lefort presents the weed-killers in classified form with information on each, together with useful advice which should enable planters to select the products best suited to their requirements without difficulty.

Clump of solanum torvum after spraying with "Trioxone".

At the end of the report there are eight tables which give brief and easily-consulted information on the herbicidal products mentioned and their type of action, and also the names and addresses of firms in the area from which they may be obtained with little delay.

It is our firm opinion that planters will find in this report, which is both clear and practical, rules of utilization applicable to their particular case.

—A.H.J.K.



Above: Map showing rhinoceros beetle distribution in Viti Levu as at 31st May last. "Boundary of infested area" is shown as at 31st May for each of three consecutive years, 1955 (nearest Suva), 1956, and 1957. Isolated infestations have been discovered near Tavua and Sigatoka.

Left: Since January 1954 every coconut palm in areas where the rhinoceros beetle is known to occur has been regularly climbed and the crown treated with a mixture of B.H.C. insecticide and sawdust, applied through a funnel as shown in this photograph.

Rhinoceros Beetle Campaign In Fiji

Early in 1953 it was discovered that the rhinoceros beetle had spread to Fiji, seriously threatening the coconut industry there. A female beetle was found in a house near Suva, and a rapid survey revealed a fairly widespread infestation near the city. Immediately a vigorous control campaign was instituted, which continues to-day.

By B. A. O'CONNOR

Senior Entomologist, Department of Agriculture, Fiji.

WHEN the beetle was found in Tonga in February 1952 there was considerable apprehension in Fiji. The quarantine measures which had been applied to shipping from Samoa for over forty years had of course not been employed with ships from Tonga. Available evidence suggested that the beetle had been present in Tonga for some considerable time, during which period ships freely entered Fijian ports after having stayed overnight in the small and landlocked harbour at Vavau. Quarantine was immediately imposed on shipping from Tonga, and an approach was made to the South Pacific Commission to have a team of research workers appointed for an investigation of measures of control of the beetle.

On 7 March 1953 a female beetle was found in a Fijian house at Suvavou, near Suva, and a rapid survey revealed the presence of the pest at distances of several miles west, north and north-east of Suva. It was decided that the expenditure of up to £70,000 per annum would be justified in an attempt to eradicate—or at least severely restrict—the spread of the pest. An immediate grant of £14,500 was made by Government, and a copra tax of £2 per ton was imposed, supplemented by an equal amount from general revenue.

The Rhinoceros Beetle Eradication Board was created to administer the funds accruing and to exercise general direction of the eradication campaign. The Board consisted of the Director of Agriculture as Chairman, and three non-official members representing commercial and planting interests. In 1955 the Board's functions were somewhat widened and its name was changed to the Coconut Pests and Diseases Board. In 1956 two more non-official members were appointed.

The rate of tax on copra has been varied from time to time, having been as low as 10/- per ton. It is now 17/6 per ton. Total expenditure for the first four years has been £217,000.

The objective of the campaign has been to prevent the beetle from reaching the important copra-producing islands of Fiji. Viti Levu, where the pest is now established, is not a significant producer, and control activities have been directed towards preventing the escape of the beetle from this island. As a corollary, every effort is being made to restrict the spread and increase in population of the beetle on the island. It has been practicable to use methods of control which would be much too expensive if the pest were already established in the copra-producing islands.

The expenditure incurred has been regarded as an insurance premium, and it is hoped that cheap and efficient methods of biological control may be discovered by the research team of the South Pacific Commission's Rhinoceros Beetle project before our copra-producing areas become infested. In the early stages of the cam-

Various species of beetle grubs (natural size). Rhinoceros beetle grub in bottom left-hand corner (somewhat extended by the injection of preserving fluid).

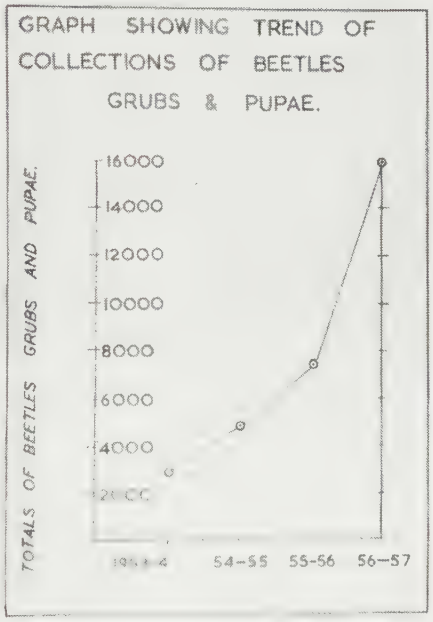
paign it had been hoped that there might be a chance of eradication, but this hope was quickly dispelled. As we know now, there was never a possibility of eradication, for in February 1954 a well-established infestation was found on the eastern coast of Viti Levu.

The campaign is carried out under the general direction of the Board. The Senior Entomologist, Department of Agriculture, and the Supervisor of the campaign, Mr. C. A. Stokes, are the executive officers. The number of personnel employed has averaged about 200, including overseers, inspectors, foremen, headmen, storemen and clerks, drivers and labourers. Establishments and equipment include offices, permanent and temporary camps, motor vehicles, punts powered by outboard engines and tools used in the various operations.

Methods of control which have been used in Fiji can be classified under the following headings:

1. *Education and Propaganda.*
2. *Quarantine and Regulatory.*
3. *Survey and Mapping.*
4. *Climbing and Treatment of Palms.*
5. *Destruction and Treatment of Breeding Places.*
6. *Collection and Destruction of Eggs, Larvae, Pupae and Adults.*
7. *Use of Traps.*
8. *Biological Control.*

1. EDUCATION AND PROPAGANDA: Efforts along these lines began as soon as the beetle was known to be in Tonga. Their object was to acquaint the public with the appearance of the beetle and its immature stages, the characteristic feeding-marks which it makes on coconut fronds, its life-history and habits, and the possible economic consequences of its introduction to Fiji. These efforts have been continued over the years, use being made of pamphlets, posters, displays of specimens, broadcasts and instruction in the schools. The public is kept informed by weekly broadcasts of

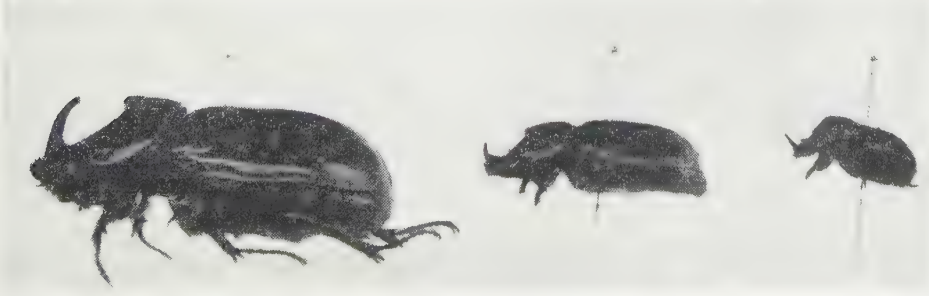


the progress of the campaign, and of any special requirements arising from our field experience.

All this is of great importance in the conduct of the campaign. For instance, the great majority of records of the beetle's occurring in new areas has come in the form of specimens of beetles or reports of damaged fronds sent in by members of the public. Our greatest difficulty has been to persuade landholders to destroy potential breeding-places.

2. QUARANTINE AND REGULATORY: The Rhinoceros Beetle Regulations, 1953, were promulgated under the Noxious Weeds and Diseases of Plants Ordinance on 17 March 1953, and several amendments and additions were subsequently made. The declared infested area is the island of Viti Levu and all islands within five miles of the coast. The main provisions of the regulations cover the restriction of the movement of soil, compost and plant material, the destruction of breeding places by owners or occupiers of land, inspection of overseas and inter-island shipping and small craft and inspection of vehicles.

Very early in the campaign, vehicle checking points were set up at Nausori and Navua, north-east and west of Suva on the road which encircles Viti Levu. After a couple of months, however, these



Side view of three species of beetles with a horn on the head and a concavity on the thorax (natural size). Rhinoceros beetle on left.

Climbing irons, which must be worn with boots, greatly facilitate the climbing of palms, especially when the trunks are wet.

were dispensed with, as evidence of the presence of the beetle had been found beyond them, and no sign of the pest had been seen on or in the vehicles which had been examined.

Inspection of overseas and inter-island shipping is actively carried on, as is also the inspection of landholdings, with special concentration on the Suva area, because many vessels leave the port en route to the copra-producing islands. Movement of compost, soil and plant material is also consistently policed.

3. Survey and Mapping: These activities are necessary to give an accurate picture of the distribution and incidence of the beetle. Survey teams at regular intervals traverse uninfested areas in search of any sign of the presence of the pest. All beetles, pupae, grubs and eggs of the pest which are collected by our field teams are forwarded to the Suva office for identification and recording. The Supervisor prepares a weekly report which embodies this information, and a study of these reports makes it possible to map the distribution and incidence of *Oryctes*. This is a useful guide in the efficient disposal of labour and resources.

4. Climbing and Treatment of Palms: Since January 1954 every coconut palm in areas where the rhinoceros beetle is known to occur has been regularly climbed and treated with a mixture of B.H.C. and sawdust.

In order to decide what mixture to use, a series of laboratory tests was carried out, the object being to find a mixture having the following features:

(a) *Reasonable cost.*

(b) *Ability to kill beetles after contact of limited duration.*

(c) *Good residual effect.*

(d) *Ease of preparation, so that it could be made up by unskilled workers.*

(e) *Low toxicity to humans.*

Sawdust was chosen as the diluent for the insecticide because it is a homogeneous material, readily available in large quantities free of charge, and does not settle into a compact mass after long exposure. Insecticides which are very poisonous to humans, such as parathion, were not tested. Trials have been made of various formulations of Aldrin, Dieldrin, B.H.C., Malathion and Diazinon. Laboratory tests take the form of a two-hour exposure of a number of male and female beetles to the insecticide-sawdust mixture. The beetles are then removed and placed in fresh sawdust, daily observations of mortality being made. The mixture is then exposed to the elements for varying periods, and further tests are made of its residual toxicity. Promising mixtures are then tested in a large cage, where beetles are liberated in the presence of treated palm-crowns.

It has been found that emulsions and emulsifiable concentrates give a quicker knockdown than wettable powders, but they have not been used in practice because they would be difficult for unskilled personnel to mix properly with sawdust. Wettable powders are visible against the bulk of sawdust, and hence are easier to mix thoroughly. A mixture of one part by volume of B.H.C. 50% Wettable Powder with nine parts of damp sawdust has been found to have the best combination of qualities, and this is the standard mixture used. A mixture of one part by volume of Diazinon 40% (sometimes given as 32%) Wettable Powder with sixteen parts of damp sawdust is superior to the B.H.C.-sawdust mixture, but its cost, which is three times as much as that of B.H.C.-sawdust mixture, has precluded its use.

In the field, the mixture is placed in the axils of the youngest four or five fronds, where most beetles appear to attack. As time goes by, a large number of frond-axils in each treated palm contain the mixture, which retains lethal qualities for six months or more. Ideally, the treatment should be repeated about every four weeks on mature palms, so that axils of new fronds are not left unprotected, but this has not been possible. Our treatments have probably been spaced two or three months apart, except in special areas such as around the port of Suva, where treatments have been more frequent. More widely spaced treatments would no doubt be adequate for very young palms, which produce new fronds more slowly than do mature palms. Since this method of treatment was begun, about 800,000 crown-treatments have been made, and the present rate is about 300,000 annually.

Each climber is provided with a pair of climbing irons, with which boots must be worn. These greatly facilitate the climbing of palms, especially when the trunks are wet. Each climber also has a sheet-steel funnel, six inches long, 3" x 2" at the upper end and 1½" x 1" at the lower end. This can be slipped into the axil of a frond, the frond being pulled outwards sufficiently to allow the funnel to rest in a suitable position. The insecticidal mixture is then poured through the funnel, and tamped down with a short stick. The advantages of using the funnel are that (a) it permits the operator to use both hands in placing

Above: Mixing sawdust and B.H.C. insecticide powder for treating the crowns of coconut palms. Close on one million crown treatments have now been made. Right: Cage used for experiments in control of the rhinoceros beetle, using insecticides.

the mixture, as it holds the frond in the correct position, and (b) it avoids tearing of the fibrous sheet round the base of the frond, which forms a pocket to hold the mixture. This is particularly important in the case of the youngest fronds, which, if pulled out too far, easily tear the fibrous sheet.

It has not been possible to evaluate the results of crown treatments in the field in Fiji, because populations of beetles are too low and damage done to fronds is negligible. In a country like Samoa, where severe and widespread damage occurs, it should be possible to assess results by comparing foliage and yield of blocks of treated and untreated palms. Some work along these lines is being carried out by the Department of Agriculture in Western Samoa.

It is not suggested that crown-treatment of palms is a practicable control measure for general use in countries where infestation by *Oryctes* is widespread. Labour costs would be far too high. The cost of the method has been justifiable in Fiji because here infestation is confined to only a part of one island where copra production is insignificant. Hence the money spent on control measures is an insurance premium paid for the protection of the uninfested islands which produce the bulk of our copra. However, there are certain cases in which it is possible that crown treatments would be worth while, even in heavily infested territories. These are as follows:

(a) In the protection of very young palms. Such palms can easily be killed by the beetle, and they are very much easier and less expensive to treat, costs of both labour and materials being very much less than for mature palms.

(b) In the treatment of palms on badly-infested boundaries of a plantation, or of very tall palms which rise above their neighbours. Dr. Cumber has stated that palms such as these are subject to particularly severe attack by the rhinoceros beetle, and hence a comparatively heavy outlay on their treatment might be repaid by the protection given to the plantation as a whole.

5. Destruction and Treatment of Breeding Places: This is a routine procedure which has been carried on since the beginning of the campaign. Breeding places such as compost heaps, piles of grass-cuttings or rice straw, rotting logs, stumps and standing trunks of palms and trees are searched, and in the process the breeding material is scattered thinly or destroyed by burning or dumped in the sea or in watercourses, etc. B.H.C. is freely applied to cope with breeding that may have been overlooked and to prevent further breeding.

Among the most difficult types of breeding-place to cope with are accumulations of sawdust produced by sawmills. Despite much searching and application of B.H.C. we continued to find considerable breeding in these situations. In February of 1956 a new method of control was inaugurated. All sawmillers in the infested area who were unable to dispose satisfactorily of their sawdust were issued each month with supplies of B.H.C. 50% Wettable Powder. Requirements for each mill were calculated from the known output of the mill. Each sawmiller was supplied with a measure which enabled him to treat each wheelbarrowful of sawdust with B.H.C. powder at the rate of six ounces per ten cubic feet.

This system appears to have worked very well. Percentages of our total collections of beetles, grubs and pupae which were found in sawdust during the years 1954-5, 1955-6 and 1956-7 were 33, 34 and 19 respectively. Significant amounts of breeding are now seldom found in the bulk of sawdust heaps. Most finds are in rather restricted areas, such as under saw-benches, which for one reason or another have escaped treatment.

6. Collection and Destruction of Eggs, Larvae, Pupae and Adults: This again is a routine measure which is carried out in conjunction with climbing of palms and destruction of breeding-places. Of the adult beetles which have been collected during the campaign, over 60% have been found in the crowns of living coconut palms. The main sources of eggs, grubs and pupae have been sawdust heaps, rotting trunks, logs and stumps of Ivi (*Inocarpus edulis*) trees, heaps of compost, rubbish, grass stems, rice straw, etc., rotting mango trees, rotting coconut palms, and rotting trees of many other species. Breeding has also been found in some rather unexpected places, such as rotting limbs of apparently healthy Ivi trees, collections of organic material in the crotch of branches of healthy trees, the floors of Fijian houses, and even in the earth hilled up round the base of a cassava plant.

The proportions of the sexes of adults captured in different situations have varied. This proportion for total catches of adults during the last two years has

(Continued on page 62)

Literature For Papuans Of Netherlands New Guinea

In Netherlands New Guinea, an extensive publishing programme to provide literature for the people of the territory is being vigorously carried out by a committee specially set up for the purpose, and the Native Information Service.

By C. W. VAN BERKEL and S. VAN DER WERFF

A selection of the wide variety of booklets, which are well-produced with colourful covers in attractive designs.

BEFORE the second World War there were already some hundreds of village schools in Netherlands New Guinea which owed their existence to the activities of the Protestant and Roman Catholic missions and which were managed by these missions with Government financial aid. After the war education was extended to a very large degree, and a great deal of attention was paid to its qualitative improvement. The results of these joint activities of Government and missions are most promising. The situation at present is that in Government-controlled areas, almost all native children have the opportunity of attending village elementary schools, while for the more gifted pupils there is ample opportunity of continuing education.

Illiteracy is thus no longer a problem in areas which have been under Government control for a considerable time; with the exception of old people, all in these areas have learned to read and write in their youth.

It should be remembered, however, that people should be given the opportunity to keep up the knowledge of reading, writing, and arithmetic which they have acquired in the village school. Of real importance in this connection, therefore, is what might be termed "after care": the provision of cheap reading matter of any kind which will prevent the loss of reading ability. At the same time, the opportunity is utilized by means of this reading matter to acquaint the people in a simple way with all kinds of aspects in the cultural, social, as well as economic fields, which are considered of importance to them.

From 1948 the Native Information Service did some work in this field, but gradually it became evident that an effective provision of literature could not dispense with the assistance of some capable body. For this reason the *Commissie Volkslectuur* (Committee for the provision of literature to native peoples) was established with the Director of Cultural Affairs as Chairman. Other members of the Committee are the Head of the Bureau of Native Affairs, and the Head and Organizer of the Literature Bureau of the Native Information Service, and also representatives of the Protestant and Roman Catholic missions.

This Committee has the task of judging the suitability for publication and distribution of manuscripts and existing books.

The executive task rests with the "native literature" section of the Native Information Service.

In this extensive territory, where places are often difficult to reach, the great difficulty was faced of building up a satisfactorily functioning colportage and distribution system. However, owing to the co-operation of Government officials and of touring school inspectors and managers, successful distribution has been established. The officers operating this scheme all have at their disposal a complete set of available books, and these are shown to the people in the villages who are told that they can order them by making payment in advance.

This opportunity of obtaining attractive literature is extensively used by the population. From the start the provision of literature has been placed on a commercial basis, as far as possible, and existing conditions necessitate a "payment in advance" system. Periodicals such as the following, issued by the Native Information Service, provide information on subjects of topical interest.

PENGANTARA (*The Link*), a weekly, which has existed for five years. This periodical, which has a circulation of 6,500 copies, gives topical news in the Malay and Dutch languages. It contains various articles on Netherlands New Guinea, particularly those dealing with the progress of the country; other local news and news from the South Pacific, the Netherlands, and other countries, and articles on national as well as international events, etc. It enjoys great popularity and takes an important place in the changing cultural and social life of the Papuans.

TRITON. An illustrated monthly, of which publication was started early in 1955. The publication of this attractively produced periodical, designed especially for the native population, was a new venture in publishing in the area, and it was accorded a very enthusiastic reception in the South Pacific.

Unlike PENGANTARA, which can be obtained free, TRITON must be sub-

scribed to, or single copies may be had at the price of one guilder.

An annual subscription amounts to the considerable sum of 10 guilders. The "subscription" idea was entirely new to the territory, and for this reason it may be regarded as most encouraging that at present the number of subscribers to this periodical amounts to 1,350, and that in its second year it can already pay almost two-thirds of its own way.

Every month there appear short stories in TRITON pointing a moral, all of which are written by Papuan authors. In addition to material under subject headings such as "Agriculture", "For Women"—the latter being handled by a native female teacher—and "Wide World", home news, news from the Netherlands and foreign countries, is also regularly given.

The periodical is published in the Malay language; a special column in Dutch is inserted for those who have learnt Dutch in order to keep up their knowledge of this language; and a children's column in Dutch is also included.

The reactions of children to this children's column are interesting and everyone seems to be eager to co-operate by sending drawings and stories. For the first time a series of articles in twelve instalments devoted to the "Change of Society" will be inserted in this year's issue.

These articles will be bound and published as a book by the Literature Bureau of the Native Information Service. This now brings us to the literature for the native people. Production of New Guinea literature was not started on a firm basis until 1955. So far the following publications have appeared:

DAMAR PUTIH MALENKA, published by the Native Information Service, 38 pages, illustrated, price f.1.

A booklet giving instruction on the tapping and processing of copal.

STOP! *Sadarkanlah batasnja*, published by the Native Information Service, 30 pages, illustrated, gratis.

This pictorial story represents in a convincing manner what excessive drinking may lead to.

SUSUNAN COOPERATIE (*Organization of Co-operation*), published by the Native Information Service, 32 pages.

This is a short and plainly written manual dealing with the administration of co-operatives.

LINKUNGAN DAPUR, S. Nur Zainuddin-Moro, published by J. B. Wolters Co., 100 pages, illustrated, price f.1.50.

This existing recipe book was specially adapted for Netherlands New Guinea by the Literature Bureau. It contains 150 oriental recipes. Within 1½ months the entire first edition of 1,000 copies was sold out. A reprint has been ordered.

This further selection of publications includes "Triton", an illustrated monthly produced specially for Papuans in Netherlands New Guinea. First published early in 1955, it was very enthusiastically received, and already paid subscriptions to it total 1,350.

HIKAJAT ASALI, a translation of *Papuan Tales*, S.P.C. Literature Bureau, 16 pages, illustrated, price f.0.50, second edition.

The first impression of this Malay translation of *Papuan Tales* was soon sold out. A second impression was ordered, of which more than one thousand copies have so far been sold.

ZAMAN KITA (*Our Time*), a collection of short stories by Papuan authors collected by S. van der Werff, published by the Native Information Service; 59 pages, illustrated, price f.1.

This booklet was printed by the Government printing office at Hollandia. Illustrations are in colour. Rock drawings recently discovered in Netherlands New Guinea were used as vignettes.

PELAJARAN HIRI (*The Hiri*), published by Longmans, Green & Co., 24 pages, illustrated, price f.1.

This is the Malay version of the story by Camilla Wedgwood published under the auspices of the South Pacific Commission.

BELANGA SIHIR (*The Magic Pot*), by Peter Livingston, published by J. B. Wolters & Co., 24 pages, illustrated.

This is the Malay translation of the booklet published under the auspices of the South Pacific Commission.

INILAH NEDERLAND (*This is Holland*). This booklet was originally published in Dutch. A translation in Malay was made by the Native Information Service.

In this profusely illustrated booklet a clear idea is given of the history of the Netherlands and of present-day life there. This booklet is presented to all native pupils when they leave school.

DE GROTE VALLEI (*The Great Valley*), by S. van der Werff, 35 pages, illustrated.

This story is based on the expedition in 1951 of Administrative Officer Meyer-Ranneft to the Baliem Valley in Central New Guinea. The story is in preparation and is expected to appear in the course of the year in Dutch as well as in Malay.

THE ADVENTURES OF BETTINA STEEKIE, by Dr. J. A. van der Hoeven, 24 pages, illustrated.

This booklet was published by the Red Cross. It deals in a simple manner with the life of the mosquito and indicates the means to control these insects. The Malay version is entitled *Peristiwa Bettina Steekie*.

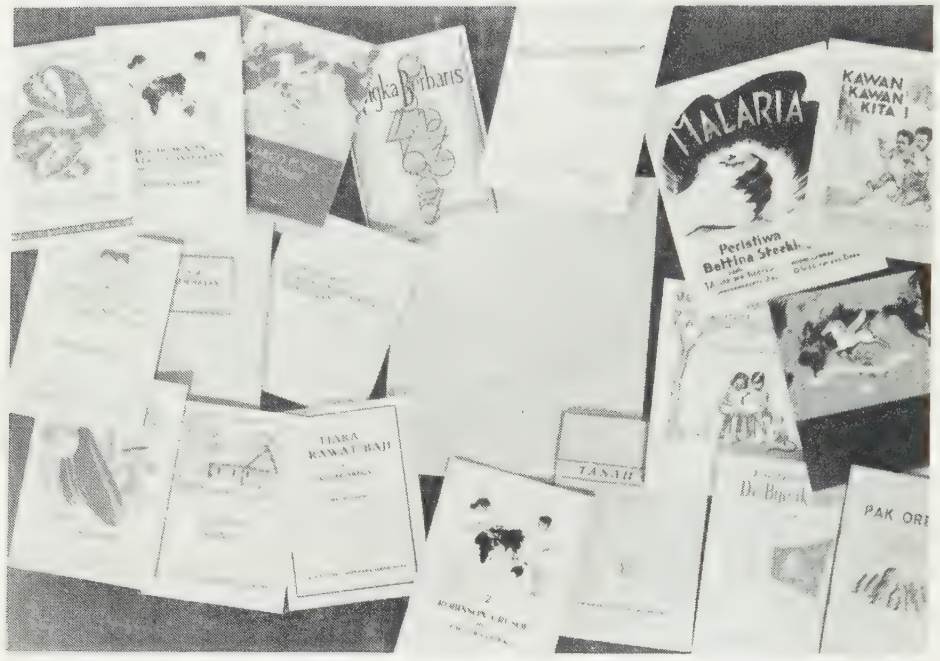
BATU KARANG, published by the Native Information Service.

This is a version of four myths of Netherlands New Guinea, written by a young Papuan author, who is at present continuing his studies in the Netherlands. In co-operation with the South Pacific Commission Literature Bureau these myths have been translated into English.

MAANDKALENDER 1957, published by the Native Information Service, price f.1.

This calendar is in two colours. The text is in the Dutch and Malay languages. By means of illustrations, important aspects of life are brought to the attention of the population.

In co-operation with the South Pacific



The booklets include several on health subjects, such as malaria, infant and child feeding, and general hygiene.

Commission Literature Bureau the following pamphlets were published:

MAKANAN JANG BAIK (*Good Food*).

MAKANAN HAROES BERSIH (*Food Should be Clean*).

Both are in the "Tina Protects Her Family" series.

The following booklets are in preparation:

HOUSE BUILDING. To stimulate the building of healthy and more comfortable houses.

GESCHIEDENIS VAN NIEUW GUINEA (*History of New Guinea*).

NERATJE MASJERAKAT (*Real Changes in Modern Times*). A booklet giving instructions on baby feeding. A booklet dealing with the feeding of children and infant mortality.

Besides this literature especially produced for Netherlands New Guinea, much use is also made of some Malay and Dutch books which were considered suitable by the Committee and of which 41 titles are in circulation at present.

A second body intensively engaged in the production of good literature is the "Educational Appliances Committee". Although the activities of this Committee are primarily concerned with schools, they should, however, be mentioned in this article, as under the auspices of the Committee many books have been written which have proved of value for use not only in schools but also for adults.

Five years ago there were no books in Netherlands New Guinea which were specially adapted for the territory, either for schools or for adults.

Books used in schools were those adapted to Indonesia; most of these were obsolete and in no way suited to the sphere of life of New Guinea schoolchildren.

If the improvement of education qualitatively was to be the ultimate aim, it appeared to be necessary to provide schools with good text-books.

It was for this reason that in 1952 the Head of the Division of European Education took the initiative in a scheme aiming at the entire replacement of old school-books by new and more up-to-date books which were better adapted to the everyday social world of the Papuan. This officer, during his leave in the Netherlands, succeeded in interesting in his scheme two authors, one of whom had been working in New Guinea as a teacher. The result of this was that a team of four authors was formed, consisting of the three mentioned above, and the Rev. I. S. Kijne—well-known in education in Netherlands New Guinea and to the South Pacific Commission.

Production of books was commenced by this team in the latter half of 1953 and has since contributed the most important share to the realization of the scheme for the renewal of text-books for schools.

Some others besides, among whom are the Head of Native Education and Dr. H. Eggink, a geographer well-known in the Netherlands, have done some outstanding work.

It stands to reason that Catholic and Protestant missions—being the administrative corporations of native education—were very much interested in the composition of these books, and therefore the Director of Cultural Affairs instituted the Committee of Educational Appliances in 1954; on this Committee there are, in addition to the officials of the Education Service already mentioned, representatives of these missions.

The result of the work of the above-mentioned Committee is very satisfactory. The village schools are now provided with proper text-books; in schools for continued education several new books have been introduced, and other books are being prepared.

At the suggestion of this Committee the Governor of Netherlands New Guinea has enabled two authors residing in the Netherlands to travel extensively through New Guinea for purposes of orientation.

As has already been stated, adults are also interested in several of these books. The Literature Bureau, therefore, is putting the following books into circulation as literature for the native population:

MALARIA. I. S. Kijne and C. W. van Berkel, published by J. B. Wolters, 35 pages, illustrated, price f.0.90.

This booklet, written in Malay as a story, describes in a simple way the cause, the results, and the control of malaria.

SEHAT DAN BERBAHAGIA. I. S. Kijne and C. W. van Berkel, published by J. B. Wolters, 40 pages, illustrated, price f.0.90.

This is a booklet dealing with general hygiene, written as a story in Malay. The meaning of the title is: *Healthy and Happy*. A translation in English of this booklet is at the disposal of the Organiser for Island Literature of the South Pacific Commission.

RUMAH SEHAT DAN KOKOH. I. S. Kijne and C. W. van Berkel, published by J. B. Wolters, 40 pages, illustrated, price f.0.90.

This booklet, written in Malay as a story, encourages the building of better and healthier houses in the villages. There is also a Dutch version of this book: *Gezond wonen* (*Healthy Living*).

OMHOOG EN VOORUIT (*Arise and Advance*). I. S. Kijne, C. J. de Witte and N. E. Bochove; published by J. B. Wolters, 143 pages, price f.3.50.

This is a geographic text and reading-book in Dutch. It is intended primarily to impart knowledge to the Papuans of their own country and people, placing emphasis on modern New Guinea, in a state of development, rather than in its primitive state. The book contains 132 attractive illustrations. It has also been published in Malay under the title *Naik dan Madju*.

ONS VORSTENHUIS (*Our Royal Family*), N. E. Bochove, C. J. de Witte and I. S. Kijne, published by The Branding Publishing Co., 36 pages, illustrated.

This book gives an historical survey of the principal personages of the House of Orange, and describes important historical and recent events in the Netherlands and in New Guinea. The text is in Dutch and Malay.

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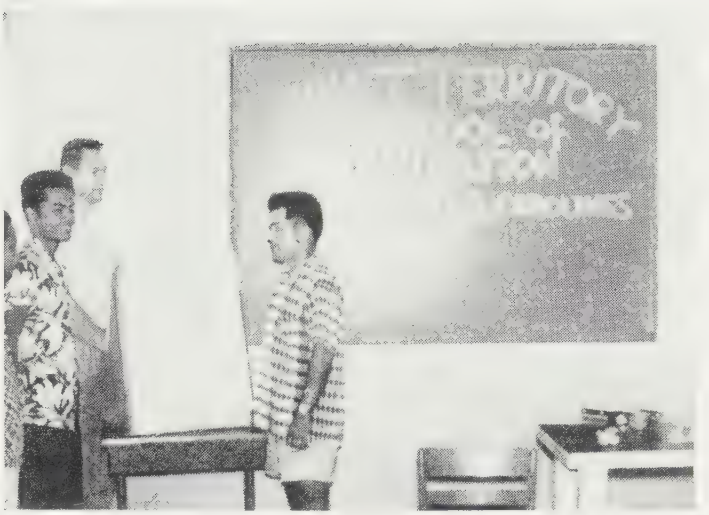


Personnel attending the U.S. Trust Territory six-week refresher course in sanitation, held at Ponape in the East Caroline Islands in June 1956. Right: Faculty members discussing the "flip" chart developed by Chief Sanitarian L. Cowper, of Guam.

Refresher Course In Sanitation For Micronesians

This is an account of a combined refresher and training course in health education and environmental sanitation. It is an excellent example of what can be done in a small Pacific island community at small cost, and using only the local skills available.

By CHRISTIAN S. NAKAMA*

THE first Trust Territory School of Sanitation was conducted at Truk, East Caroline Islands, in June, 1954. It was a twelve-week training course and the curriculum consisted of 398 hours' tuition, with an enrolment of 22 students.

The Refresher Course which is the subject of this article was conducted at Ponape, East Caroline Islands, in June 1956. It was a six-week course. The curriculum consisted of 190 hours' tuition, and there was an enrolment of 34 students. The students were sanitarians, sanitation workers, sanitation trainees, and science teachers.

The Course resulted from a realisation that there was urgent need for a refresher course for the Micronesian sanitarians who had previously had the longer initial training course in sanitation. It was also felt that local science teachers concerned with this branch of teaching would profit by such a course.

A questionnaire to all the previous trainees enabled us to ascertain the subjects most likely to be of value, and the final curriculum was evolved following discussion with experts in all the fields concerned.

There now follows a description of the scope and methods of the Refresher Course, as it was finally carried out.

Purpose Of Course

The purpose of the Refresher Course was two-fold. First, to provide for Micronesian public health sanitation personnel, additional training in environmental sanitation with emphasis on health education; and, second, to offer instruction in the basic fundamentals of sanitation to Micronesian science teachers.

The students represented the seven districts of the U.S. Trust Territory, six of which are administered by the Department of Interior (Rota, Palau, Yap, Truk, Ponape, Marshalls) and one by the United States Navy (Saipan).

So far as their previous education was concerned, the students fell into two groups. Half were graduates of the Pacific Islands Central School, which is the highest institution of learning in the Trust Territory. The remainder were graduates of public intermediate schools, or mission schools.

The youngest student was 17, the oldest, 32. There were 29 male students and 5 female students. The average age was 22.6 years.

Content Of Refresher Course

The curriculum consisted of the following courses:

1. Environmental Sanitataion and Health Education Methods.

Instructor: Lawrence Cowper, B.S., M.P.H., R.S., Chief, Sanitation Unit, Dept. of Public Health, Government of Guam.

The course consisted of 44 hours equally divided among classroom lectures, laboratory demonstrations, field work, and projects.

Classroom Lectures covered the germ theory of disease, intestinal parasites, water supply, food supply, home sewage disposal, garbage and refuse disposal, insect control, insecticides, rodenticides, proper use of visual aids and health education techniques.

Laboratory Demonstrations covered the following: Proper use of the microscope, bacteriological test for water, bacterial growth on Petri dish, stool examination and identification of ovum of ascaris.

Field Work consisted of the following: Standard sanitation inspection of restaurants, bakeries, fish storage plant, slaughter house, ice cream and ice cake stores, vegetable market, and other food dispensing establishments. Inspection of the Ponape water system and conducted inspections of two native villages; Kapingamarangi and Sokas. Students submitted reports on all these inspections, listing deficiencies and recommendations for correction.

The projects consisted of the following: Sanitation survey of the town of

* Chief Sanitation Supervisor, Department of Public Health, United States Trust Territory of the Pacific Islands.

Left: Native benjo (privy) built over tide-water of locally-available materials. Sokas village, Ponape. Right: Concrete water trough for washing clothes and bathing, made by the residents of Sokas village.

Colonia, Ponape Island; the making of insecticide solutions using DDT and Chlordane, preparing Warfarin (rodenticide) mixtures with copra, making bait stations by using bamboo tubes, and visiting the Ponape education print shop to observe the silk screen process in operation.

During the evening study hour the following seven training films were shown:

Water Purification (U.S. Army Training Film)

Sanitary Devices in the Field (U.S. Army Training Film)

Habits and Characteristics of the Norway Rat (U.S. Public Health Service Training Film)

Habits and Characteristics of the Roof Rat (U.S. Public Health Service Training Film)

Practical Rat Problem (U.S. Public Health Service Training Film)

Medicine in Action—The Story of DDT (U.S. Army Training Film)

Watch Tower of Tomorrow (The Story of the United Nations Organization).

Throughout his series of talks and demonstrations Mr. Cowper stressed the importance of proper health education techniques, and the use of community development principles in introducing health and sanitary control measures for island village communities. He used the excellent flip chart on sanitation which he developed for use on the Island of Guam, and emphasised the value of visual aids in promoting effective health teaching.

2. Sanitation Programme.

Instructor: Christian S. Nakama, B.A., M.A., M.Sc., R.S.

The course consisted of 40 hours of classroom work, discussions, and lectures by members of other departments of the Trust Territory Government. The course stressed the importance of health education, and community organization aspects of sanitation programming at the district and village levels. For this course Dr. M. Derryberry's article, *Health Education Aspects of Sanitation Program In Rural Areas and Small Communities,* W.H.O. Bulletin, Vol. 10, No. 2, 1954, proved most helpful.

Dr. John Mills, social-anthropologist, rendered valuable assistance as a source of information on the principles of community organization. Dr. Mills conducted a highly successful pilot project in village health and sanitation for the village of Sokas, Ponape Island. The students inspected the village and observed the improvements such as construction of concrete troughs across several streams for bathing and washing purposes, penning pigs above the tide-water mark, privies built solely with locally-available resources, and the results of health education work as shown by the general improvement in the hygiene of the village. Prior to the pilot project, the village of Sokas was found to be in a very insanitary condition. Now, it is one of the cleanest on the island.

Various persons from the other departments of the Trust Territory Government were invited to describe to the students the functions of their departments in relation to the objectives of the Government. The lecturers included Judge Edward P. Furber, Chief Justice, who spoke on "The Code of the Trust Territory and the processes of Democratic Government"; Dr. H. E. Macdonald, Director of Public Health, whose subject was "Advanced Education for Micronesian Public Health Workers outside of the Trust Territory"; and Dr. Tracy Storer, Prof. Emeritus, University of California, who spoke on "The Work of Scientists and the History of the Plague Control".

At the end of each talk, a short discussion period enabled the students to ask questions which produced interesting discussions.

3. Rodent Control.

Instructors: Dr. William Jackson and Dr. Robert Strecker, Pacific Islands Rat Ecology Research Team of the Pacific Science Board.

This course consisted of 40 hours equally divided among classroom lectures, laboratory work, and field work. The lectures included the subject of rodent ecology, anatomy, and life history. The laboratory work included identification, dissection, autopsy, and the preservation of skins. The field work included rodent surveys, setting trap lines and collecting specimens.

An important outcome of this course was the realization of the need of a simple rat control manual for the Trust Territory. At Dr. Storer's suggestion, Dr. Jackson and Dr. Strecker have prepared the preliminary draft. If it proves satisfactory, it will be translated into the various district languages by the Micronesian sanitarians.

4. Tropical Agriculture and Sanitation.

Instructor: Edward Iwaniec, B.S., Ponape District Agriculturist.

This course consisted of four hours spent at the Ponape Agricultural Experiment Station. Throughout his talk, demonstrations, and field work tour, Mr. Iwaniec stressed the close relationship between good sanitary practices and good crop production. The Ponape Experiment Station's neat appearance and clean environment impressed everyone in the class.

5. The Sanitarian as a Teacher.

Instructor: Clarence Peters, B.A., Teacher Trainer, Ponape Education Dept.

This course consisted of four hours of classroom lectures, demonstrations, and general discussions. In his teaching Mr. Peters drew on his personal experience and observation while engaged in teaching and community development activities on the Island of Kusaie, Ponape District. The Micronesian sanitarian who worked there also gave a talk on his work in health and village sanitation. Mr. Peters gave the group many practical hints and suggestions on the organizing of island communities for educational endeavours, based on results obtained on the island of Kusaie.

6. Seminar in Sanitation.

Expert Panel: Dr. H. E. Macdonald, Dr. J. Mills, Mr. L. Cowper, and Mr. C. Nakama.

This course consisted of 10 hours of individual report and discussion periods. Each Senior Sanitarian presented an oral report on the sanitation problems in his particular district. He listed successes as well as failures in health education and inspection efforts. Then the class entered into a general discussion with the speaker as the chairman.

An important outcome of these discussions was the realization of the need for constant evaluation of health education programmes in order to gauge the effectiveness of techniques employed. No universal techniques were evolved. Rather, each district appears to represent a distinct cultural pattern and, therefore, techniques in health teaching should be based on a sound understanding of this cultural mechanism. It is always necessary to bear in mind that changes in attitudes and health habits take years, sometimes generations, depending on the rate of social development of that particular island community.

7. Evening Study Hour.

Instructor: Mr. C. Nakama, Chief Sanitation Supervisor.

The students completed a total of 48 hours of study under supervision. During this period they reviewed the day's lecture notes, read the books and magazines placed on the reference shelf, and prepared for the next day's class.

A total of seven training films were shown during this period. Following each showing a general discussion led by the Sanitation Supervisor reviewed the contents of the film. In this manner, many matters not covered by classroom lectures, were emphasized.

Budget For Refresher Course

The Director of Public Health allocated the sum of $2,000 for the training programme. This was to cover the cost of meals and school supplies while the students were on Ponape Island. Each district was responsible for the cost of return fares for its quota of students to and from Ponape. The low cost of the training programme was due to the maximum utilization of the facilities of the Ponape Education Department. The final cost amounted to $1,817.

Certificate In Sanitation Awarded

Miss Rosa Siro, teacher of home economics, Palau Education Department, has the unique distinction of being the first Micronesian woman ever to be awarded a Certificate in Sanitation from the Department of Public Health, Trust Territory Government. Not only did she do well in an otherwise all-male class, but because of her fine personality, she was elected Valedictorian and delivered a fine oration entitled *Sanitation is a Way of Life*.

Summary and Recommendations

1. A six weeks' refresher course in sanitation with emphasis on health education provided training for 34 Micronesians at a cost of $1,817.

2. The curriculum was derived and developed from the expressed wishes and needs of the Micronesian sanitation workers. It was reviewed and discussed with a panel of experts.

3. Micronesian students with intermediate school background can be taught the fundamentals of environmental sanitation. Graduates of Pacific Islands Central Schools can be trained to become proficient sanitarians.

4. Refresher courses in sanitation should be presented at regular intervals of two years in order to keep sanitarians informed of developments in sanitary science and health education techniques for island communities. There should be proper emphasis on classroom lectures, demonstrations, laboratory work, and practical projects.

5. Capable and qualified instructors of local origin should be included on the teaching staff of training courses.

6. Training programmes should be properly documented so that there will be systematic and continuous teaching methods.

7. The content of the curriculum should be developed and presented with reference to the educational capabilities of the local students, especially their knowledge of English.

Literature For Papuans Of Netherlands New Guinea

(Continued from page 38)

De Aardrijkskunde van Nieuw-Guinea (*Geography of New Guinea*), Dr. H. Egginк.

This method of teaching geography consists of:

(a) An atlas of New Guinea, published by W. Versluys.

(b) A manual, published by J. B. Wolters.

This modern method of teaching has been enthusiastically received for use in schools, and adults of different nationalities have expressed much interest in it.

Dieren van Nieuw-Guinea (*Animals of New Guinea*), by Dr. L. D. Brongersma, N. E. Bochove and C. J. de Witte, published by J. B. Wolters, 92 pages, illustrated, price f.3.75.

The title of this book needs no further explanation. This attractively illustrated book (110 illustrations) is just off the press. Although primarily intended for the higher standards of elementary schools and for schools of continued education, this book will undoubtedly find its place among the literature of the native.

Kawan Kawan Kita (*Our Friends*), I. S. Kijne, N. E. Bochove and C. J. de Witte, published by J. B. Wolters, in three parts of 75 pages each, price f1.75 each, illustrated.

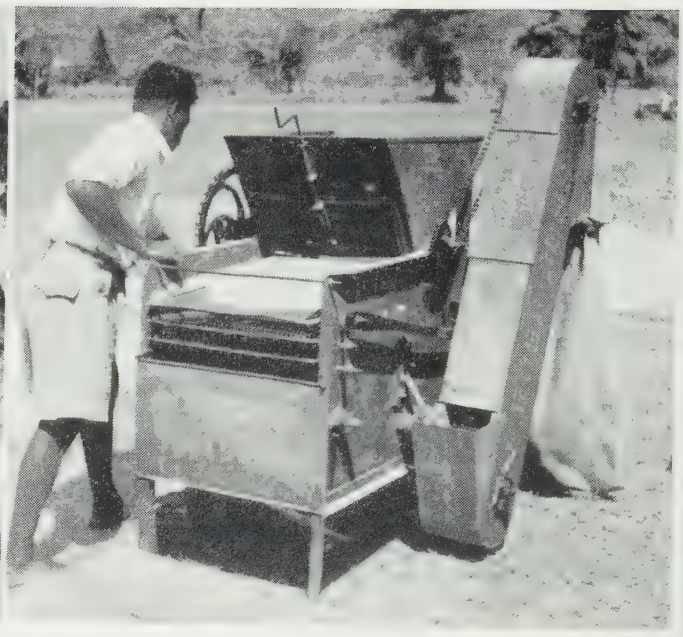
These three books are intended for pupils of village schools, but are also read by many adults. It is a continuous story, the scene of which is laid in the village environment of the Papuan youth. It is written in Malay.

Although the Literature Bureau also aims at changing the views and mentality of the indigenous peoples and at focusing attention on the modern way of life by means of providing literature, yet not all books are of a pronounced moralizing or *tendentious* character. Ordinary literature intended for recreation is also widely distributed and there is an ample choice from existing books in the Malay language.

The problem of an efficient provision of literature has of late years been energetically dealt with.

Results are satisfactory and we have now come to the stage where the existing desire to read among the native population can be reasonably met.

We rejoice at the fact that the demand for literature is still increasing and that many Papuans are prepared to spend quite considerable amounts of money on books which they wish to secure. It also means that we should remain active in order to supply the increasing demand. This is not difficult, however, as the favourable results provide much satisfaction and are the best incentive to continue the good work.



A rice harvesting machine being towed by a Ferguson tractor in the Rewa district of Fiji. Right: A portable rice-hulling machine being used in the same area.

Mechanization of Agriculture In the South Pacific

Planned mechanization of agriculture in some territories of the South Pacific could give increased production with lower costs, resulting in higher living standards for the inhabitants.

By E. J. E. LEFORT*

AGRICULTURAL mechanization is mainly of value in areas where there is a shortage of manpower in relation to the land available. Such a situation exists in some islands of the South Pacific; in others quite the opposite is true. Introduction of agricultural mechanization into this vast area should therefore be based on differing considerations according to whether the islands concerned are under- or over-populated.

Mechanization is not only a solution to the shortage of labour in under-populated countries, but is also a means of increasing the value of available manpower by a consequent rise in production. A further result of this is a fall in production costs, thus making it possible to cultivate land which would scarcely have proved profitable without advanced mechanization.

In over-populated countries the haphazard introduction or extension of agricultural mechanization often results in aggravation of social and economic problems. However, if this measure is considered primarily as a complement to economic growth and the development of the community, its effects may be beneficial provided a simultaneous attempt is made to find employment for workers who have become redundant through the introduction of machinery and to make facilities for mechanization available to small producers by some appropriate system (co-operatives, for instance).

* Research Officer for Economic Development, South Pacific Commission.

The Deciding Factors

In both the cases briefly described above the deciding factors in the introduction of agricultural mechanization spring from consideration of the following data:

The labour force, its size and degree of progress;

the system of land tenure;

the size of undertakings;

capital available for mechanization;

the nature of the terrain and the available areas;

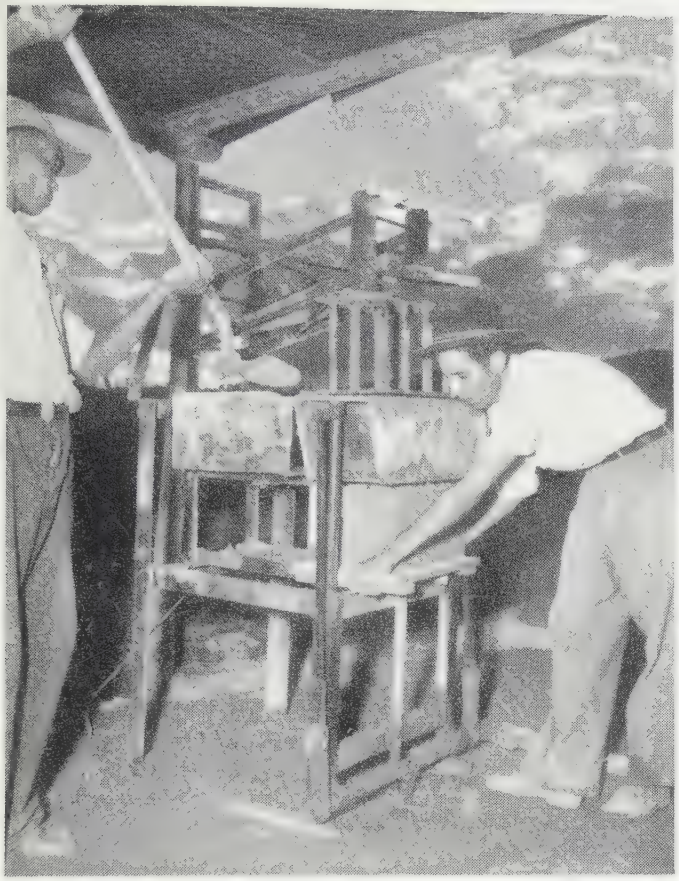
technical resources for mechanization (source of supply of equipment, adjustment, repairs, servicing).

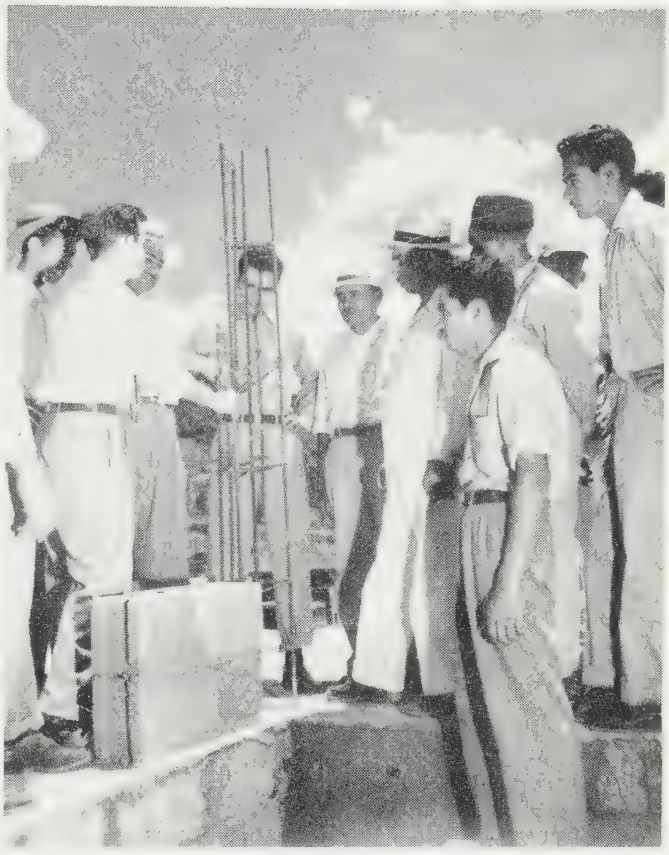
We shall not dwell on the question of the amount of manpower available and its consequences, but shall stop to consider the degree of progress which often conditions the eventual results of agricultural mechanization. Indeed, the islanders, and also some Europeans, only too often tend to confuse mechanization and motorization.

The fitting of tractors is admittedly a serious problem in itself (power, fuel, grip), but it is insignificant in comparison with the study of the rational utilization of drawn or carried agricultural implements which are the real deciding factors in mechanical cultivation. On the other hand, accustoming under-developed communities to using agricultural machinery is a problem which needs to be approached with great care so as to avoid achieving the opposite of the aim in view. In the South Pacific, these two aspects call for serious basic education from the technical and psychological angles respectively.

Land tenure is often an obstacle to the introduction of an advanced agricultural system. In this respect the large estate is generally in a better position; the economic status of small planters on the other hand prevents them from undertaking rational cultivation individually. This is a difficulty which might be easily overcome by establishing some system of association.

(Continued on page 50)





This machine was constructed by Puerto Rican agregados, or landless agricultural labourers, to make cement blocks for building their homes on plots of land leased to them by the Housing Authority. Right: Agregados learning how to build their own homes, using cement blocks made by the machine shown on the left. Toa Alta, Puerto Rico.

Low-Cost Homes By Aided Self-Help

To provide low-cost homes for low-income families, the aided self-help principle is being applied with much success in the government housing programmes of many tropical countries, planned to combat acute post-war housing shortages. Part 1 below of this two-part article reviews the aided self-help housing programmes of several Caribbean countries. Part 2, to be published in the QUARTERLY BULLETIN *for January 1958, will briefly survey similar programmes of other tropical countries, and will discuss the basic essentials of such schemes.*

SINCE the end of the war there has been a general housing shortage throughout the world. In tropical areas where overcrowded, structurally unsound and insanitary buildings are commonplace, the shortage has been intensified by the drift of workers from country to towns in search of work. This drift has caused a rapid growth of slums in already over-crowded tropical centres, while in country areas a large section of the population is made up of landless peasants living in one-room shacks. Natural disasters such as earthquakes, hurricanes and floods have further aggravated the position.

Unfortunately, in most tropical areas housing needs have been over-shadowed by urgent economic problems—low-level production and unfavourable trade balances, reflected in low national incomes and generally low individual incomes. Thus few people have been able to buy or even to rent homes built as profit investments. In these areas there is also a lack of building know-how, of trained technicians and even of building materials, certainly of imported building materials.

Governments in these areas have generally recognised their responsibility for financing housing schemes and community development projects in rural and urban areas. They also accept the view that such schemes should aim at long-term rather than temporary solutions.

Because of these considerations governments have found housing by "aided self-help", in which the prospective home-owner helps so far as is possible to build and maintain his own home by providing part of the cost of land and materials and by doing some of the actual construction work on his home in co-operation with others faced with the same housing need. The authorities provide a flexible form of assistance by supplying finance, often in the form of building materials given to the householder on credit, technical assistance and supervision of the building of the house,

An aided self-help home under construction.

the loan or hiring out of tools and equipment, the sub-dividing and pegging out of the land required for a number of houses, and the accounting and general supervision of the finances required for such a scheme.

Self-help housing is not new. In one form or another it has been a feature of village life in most tropical communities. Aided self-help housing is new, but not so different as to upset established traditions or customs. With government co-operation, aided self-help housing seeks to help householders to own a home within the economic limits of the family and the nation. The materials and methods used, and the types of homes produced, vary greatly from place to place, but the principles involved and the experience gained in self-help housing can be adapted to any part of the world.

B.W.I. Housing Conference Conclusions

It is interesting to note the conclusions published in the report on the British West Indies Housing Conference, held at Barbados in June 1951:

1. The application of the principle of self-help housing and rehousing schemes assisted from public funds has already proved fruitful of results in certain British Caribbean territories.
2. Such "aided self-help" schemes represent the most economical method of providing housing for the lower income groups, and hence the most advantageous use of limited funds in this field.
3. The increased use of schemes of this type, and their introduction to those territories where they have not yet been tried out, should be urgently considered by governments in connection with any measures designed to alleviate the housing problem.

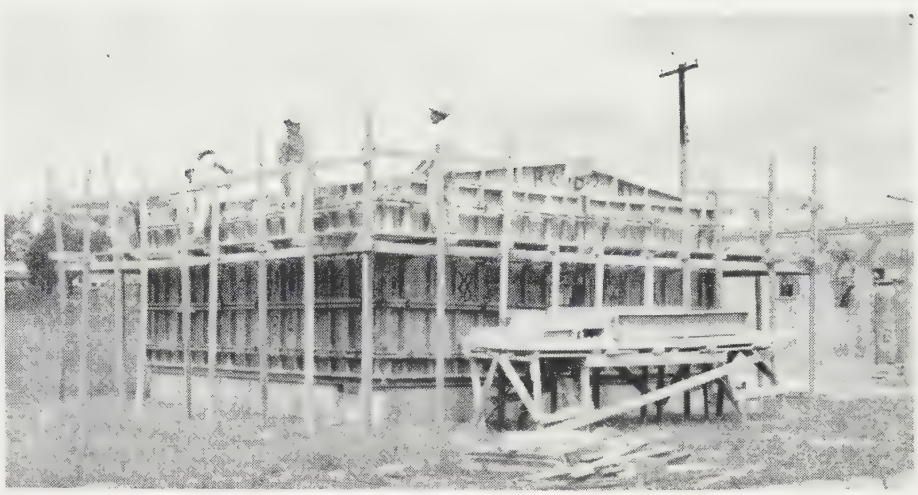
Perhaps the best way in which to gain an appreciation of both the advantages and difficulties of this approach is to examine projects in self-help housing that have been carried out in various parts of the world. Foremost in this field are the countries of the Caribbean area, where the housing situation has been critical for many years. For example, in the city of Bridgetown, Barbados, during 1946 a survey showed that out of 7,984 houses of the lower income groups, 3,022 were unfit for human habitation, 2,710 were in need of repair and 1,647 were overcrowded as well as being in need of repair.

Attempts to remedy this situation had already been commenced. The Barbados Housing Board had purchased six acres of land at Deacons, about two miles from the city and on this had erected 66 timber houses during 1940-1. The Board intended to use these houses to accommodate families from the slum shacks being demolished. After 13 homes from one of the worst slum areas had been demolished, it was found that only three of the families were willing to occupy houses at Deacons under the hire-purchase system. Some of the families were unwilling to leave the heart of the city, while others felt that the weekly rents of 60 cents (Barbados dollar equal to 5/- Australian) to 86 cents (4/4 Australian) were too high. Eventually suitable tenants were selected from a list of applicants, but it was realized that slum clearance is not just a question of erecting new houses to be offered at cheap rents, but that the sociological side has also to be taken properly into consideration.

The Board then obtained land at Belfield in 1942. It removed 68 houses from congested slum areas and re-erected them at Belfield on blocks of land each 60 feet by 40 feet. Each block was supplied with a water closet, tap shower and fences. The houses were all owner-occupied and this type of development, which called for a certain amount of self-help, proved very popular.

One of the problems in Barbados has been the use of imported timber to build homes, as there is no building timber available locally. Due to insecurity of land tenure, the poverty-stricken local people prefer to build with timber, such

A team of agregados engaged in roofing a house.



An urban zone house being built under the Puerto Rican aided self-help programme for town dwellers.

houses being easily pulled down, moved to another site and re-erected.

To encourage families to build in stone, concrete blocks, and similar durable materials, the government is leasing land for 99 years. They have designed a simple model house to be built by aided self-help teams at Clinkers. The size of the house is 20 feet by 18 feet and includes a living room, 2 bedrooms and a kitchen, the bathroom and pit latrine to be constructed at the back of each yard. The house is to be constructed from concrete blocks (made by the teams), with timber floors and asbestos roof.

The estimated value of the materials used in the homes is 810 BWI dollars (approx. £204 Australian). If paid labour were to be employed the cost would be approximately 2,100 BWI dollars (approx. £525 Australian). Thus, when the houses are completed with owner labour the home owner has a home valued at £525, but his debt to the Government for materials will be only about £200 Australian. This amount is repaid over a long period at an interest rate of 2%.

Two Programmes In Puerto Rico

In Puerto Rico two types of aided self-help programmes have been started, one for rural families and one for town dwellers.

It was found that in the towns in Puerto Rico most low-income families were living in tumble-down shacks on blocks of rented land with insecure tenure. The Puerto Rico Housing Authority acquires land, instals sanitary facilities and roads, leases adequate plots to these families and helps them move their little shacks to the plots for temporary use. Then, with the assistance of the Housing Authority, the families undertake to improve or replace their shacks. Various methods are used and various houses are erected, but they all involve aided self-help. The improved or new houses are vastly better than those in the slums, having adequate land for the children to play on, good sanitation, etc. The cost to the Government is less than half that of building a new housing project and at the same time the owner obtains a home which is within his means.

The financial side of this undertaking is worth considering. Transportation of the house from the slum costs about £15 Australian, which is paid by the Housing Authority. An additional amount is invested by the Authority in foundations and improvements at an average of about £165 Australian. The householder, having security of land tenure, is prepared to improve his home. His monthly land rental depends upon his income, and if he wishes he may buy his block of land over a period of twenty years.

In Puerto Rico the *agregado,* or landless agricultural labourer, lives as a squatter in a one-roomed shack without sanitation or water. He has few rights and since he actually owns no place to live in he is forced to sell his labour to any owner who will allow him to erect his make-shift shack on that land.

25,000 Families Re-settled In 181 Rural Communities

It is a basic part of the rural programme of Puerto Rico to provide the *agregado* with a plot of land large enough to enable him to build a home with enough space for keeping domestic animals and growing a garden, in the hope that being delivered from coercion the 75,000 *agregado* families will be free to sell their labour for a fair wage. So far, under the Community Action plan, 25,000 families have been resettled in 181 rural communities, varying in size from 100 to 500 families.

To assist this programme the Social Programs Administration organises the *agregados* into groups of 12 to 15 families to form self-aid housing teams to improve their housing conditions. The Social Programs Administration selects sites for the new settlements, subdivides them into plots from one-fourth of an acre to three acres in size, and cedes the lot to the families for their use.

Since the funds for rural housing programmes are very limited, only a small number of rural communities can benefit each year. As it is very difficult to select the few communities in which work will be done, some criteria for community selection were established and

A typical urban zone home built under the Puerto Rican aided self-help programme.

COST STATEMENT

Prepared by The United States Housing and Home Finance Agency, November 1950.

Elements of the Money Cost for the First Project of 12 Houses at "San Jose". Toabaja, Puerto Rico, are as follows:	Purchase Price	Total Money Cost of 12 Houses
1. Warehouse and Machine Equipment:		
Concrete block machine	$250.00	
Concrete mixer	590.00	
Warehouse (materials)	114.63	
Total cost of warehouse and equipment to be used for at least 100 houses	954.63	
12% charged for the use of above warehouse and equipment on these houses		$114.56
2. Miscellaneous Equipment:		
Mason and carpentry equipment, wheelbarrows, timber forms, palets and mixing platform to be used for at least 100 houses	$679.33	
12% charged for the use of above items on these 12 houses		$81.52
3. Construction Materials:		
Materials	$2,482.51	
Transportation charges	320.00	
Total cost of materials for these 12 houses ..	$2,802.51	$2,802.51
4. Supervision		700.00
Total amount charged for 12 houses		$3,698.59
TOTAL MONEY COST PER HOUSE		$308.22

the communities selected on the following pre-requisites:

Inadequate housing—interested families who are able to give freely of their own labour—roads adequate for transportation of building materials—some form of water supply—families with a positive attitude towards co-operative and group action—an active community council—completed works of general community improvement accomplished by the families—willingness to abide by the regulations established for the operations of the projects.

Some weekly community meetings are held by the SPA to explain the project. In the first meeting, Community Action is discussed in all its phases and in the second meeting there is a discussion of housing. The people learn how a community is selected and are then able to decide whether their community can hope to qualify. Finally, a list is made of the families interested in participating in the housing project.

In order that this programme can be demonstrated in as many communities as possible, candidates are selected from the interested families to form an initial group of twelve, fifteen or eighteen households. In this way each household provides one man-day each week, based on a three-man working team.

In choosing the team a second set of criteria has been established: The man must be the head of a family and live with his wife and children—have a home in bad condition—be honourable and have the reputation of being a good worker—be capable of learning to build by new methods—be able to pay the debt he will contract in building the house—agree to construct the kitchen, doors and windows of the new house from the re-usable material from his old home—work on the days stipulated—make the first half down payment at the beginning of the construction and the second half when the roof is completed —take good care of the construction materials and equipment used in the work—abide by the rules of the programme—attend all meetings held on the project.

Prospective candidates are thoroughly investigated by a social worker before a final selection is made.

The first act of the group is to build a shed to house the equipment lent by the SPA. The houses are built of concrete blocks made by the families with a block-making machine on loan from the SPA. When enough blocks have been completed to provide each family with a sufficient number for the construction of its house a meeting is held to decide the order of house building. The block-making machine, the concrete mixer and other equipment on loan from the SPA are then moved to another project.

At this stage a Government technician visits the community and spends one day helping to select and stake out the sites for the new houses. The necessary construction materials are given to each family and a receipt is signed. Tools are supplied by the SPA, and on the assumption that these will be used to build at least 100 houses the groups are charged for them only on a percentage basis. For example, if 16 houses are to be built, the group will be charged only 16% of the price of the tools, and when this project is completed the tools will be handed on to another community in the scheme. Each family is made responsible for the material for the construction of its house and also for caring for the tools that it is using.

Until the roofs are on the houses the work is supervised by a foreman hired by the SPA, his job being not only to supervise the actual building, but also to instruct the community team and generally to help them to work together successfully.

When the roofs are on, group action on housing ends. Each family must then do the plastering, painting and internal partitioning and construct the porch on its own house. As everyone is anxious to move into his new home, every spare moment is spent on finishing the house, the completion of which is usually an occasion for community celebration. The families, through their co-operative labour, plus some help from the Government, now have strong, well-ventilated houses built at a cost of £150 Australian, but worth at least £750—a gain for the individual families, the community and the national wealth.

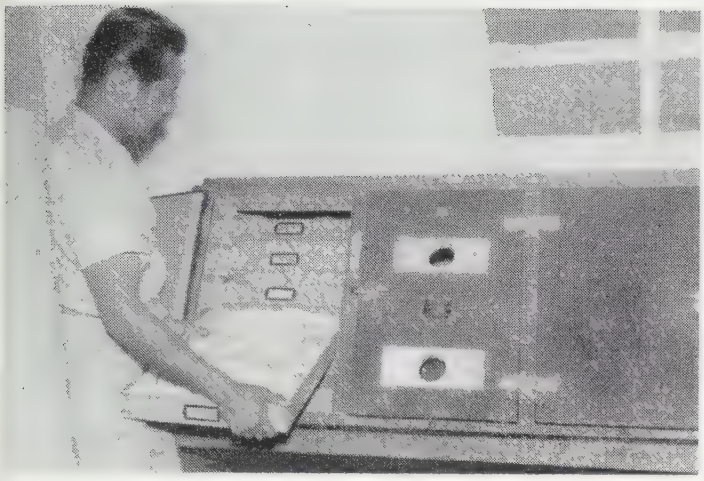
Note: This condensed section on Puerto Rican housing was prepared by the U.S. Housing and Home Financing Agency, Washington, and printed in the *United Nations Housing and Town and Country Planning Bulletin* of January 1952. The same publication contains an article, "A Manual for Developing an Aided Self-Help Programme", which would be of the greatest use to persons interested in this field and anxious to undertake a scheme of this type.

New Zealand Offers Marine Training Scholarships To Islanders

Four scholarships are being offered to islanders from New Zealand-administered Pacific territories for training in Wellington in navigation and marine engineering.

The scheme is part of a Government plan to improve navigation and engineering standards in the islands. Under it, men working on local vessels will be given a concentrated course lasting several months. The Government will pay half the costs and the employing ship-owner will be asked to pay the other half. The Government will wait until the first four candidates have completed their training before deciding whether more scholarships should be offered.

Other ways in which island shipping facilities can be improved are also being investigated.



About 30,000 eggs are incubated yearly by the Department of Agriculture in modern electric cabinets. Right: Coop for protection of young chicks at a ranch site in Guam.

Poultry Raising In Guam

Actively fostered by the Department of Agriculture, the poultry industry in Guam, which serves extensive civil and military markets, has an annual turnover of around one million dollars.

By M. A. CALVO, E. A. SALAS, O. N. LIMING*

POULTRY raising serves two important purposes in Guam. It provides chicken meat and some fresh eggs for most Guamanian families, and as well, fresh eggs for civilian and military markets. The types of chickens, housing and feeding are different, depending on which purpose they serve. This article describes both methods, but emphasizes the benefits of modern poultry practices used to produce eggs for markets. The raising of fighting cocks, although engaged in by many Guamanians, is not discussed here.

Chickens for Family Use

Most Guamanian families have 25 to 100 chickens around their village or ranch houses. The stock is usually a mixture of many breeds, including fighters; and after many generations, the chickens have become adjusted to Guam conditions. These so-called native chickens run free about the ranch and are provided only crude nest shelters and some protection for baby chicks. They feed largely on insects, wild seeds, fruits, and split or ground coconut. Most of them get limited amounts of commercial grain feed, occasionally some cooked breadfruit and papaya, and some scraps from the table.

Some losses result from animal predators and diseases. Most medicines are of a "home remedy" nature, and no fowlpox or New Castle vaccines are used on these local chickens. The low mortality under these conditions attests to the hardiness of the native chickens after they pass the chick age.

The hens incubate their own eggs, sometimes laid in the brush but usually in sheltered nests. Occasionally, setting eggs may be obtained from a neighbour who has more desirable stock. The hens, with two to twelve chicks each, may be penned for two or three weeks in bamboo or wire coops. Sometimes there is a heavy loss of chicks as a result of fowlpox.

The Guam family eats more chicken than any other meat, often four to six birds a week. The roosters are killed as they reach full size and, if the demand is heavy, the killing may extend to hens. The meat is prepared in many ways; fried in coconut oil, boiled with ginger, and stewed with vegetables. Eggs are of secondary importance, and sometimes are not regularly gathered even though the family may pay $.85 to $1.25 per dozen for store eggs.

The economic aspects of such subsistence poultry-raising has not been evaluated, because such efforts are mostly for the convenience of the family. The activity calls for practically no equipment and very little cash for feed, and the necessary work can be divided among several members of the family. The meat and eggs provide palatable and nutritious food for everyday use and can be a source of extra food needed for visitors and fiestas.

Production of Eggs for Market

Modern poultry raising was introduced to Guam by the United States Department of Agriculture as early as 1912, but there was no big market for eggs at that time. Everything was lost during the enemy occupation of the Island in the 1940's. The present programme began to make headway only a few years ago, but has reached a level of about one million dollars a year.

Breeds of Chickens

Although chicks of several breeds have been produced by the Department the present programme is limited to White Leghorns and New Hampshire Reds. Other breeds with similar characteristics are probably equally good, but the two breeds now available meet the needs of the poultrymen. White Leghorns produce the most eggs, but some prefer the heavier Reds because of their higher value at culling time. Some crossing of breeds has been done, but the merits of F-1 hybrids have not been determined. Such tests are being planned by the Department.

Source of Chicks

In 1947, the Guam Department of Agriculture started producing (and con-

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Special pen for growing pullets which will be moved later to individual cages. Right: Debeaking a pullet by touching the tip of the upper beak to an electrically-heated rod.

tinues to produce) baby chicks for sale to farmers at a reasonable cost price. During the last three years, farmers purchased about 100,000 baby chicks at $.25 each. During this same period, poultrymen imported about the same number of sexed chicks, largely from the United States, at a cost of about $.65 per chick. The higher-cost chicks are imported largely because some poultrymen want only pullets. At this time the Department is starting to provide 3-week-old, vaccinated pullets for $.70 each. No chicks are hatched by local producers of eggs for market. To assure 1,000 laying hens, it is advisable to start with about 1,400 sexed chicks.

Care of Chicks

Baby chicks are usually kept on a dry floor, covered with dry sand. The building must be open for ventilation, but the chicks must be protected from rain and wind. An area of 50 square feet is desirable for 100 chicks up to 6 weeks of age. Usually, a 100-watt electric light with reflector is hung about 14 to 18 inches from the floor. The baby chicks can stay near to or at a distance from the light to suit their needs for warmth. Droppings and spilled feed should be swept out weekly, or immediately if the floor becomes wet.

Feed and Water for Chicks

Baby chicks are fed an imported "starter" mash until they are 6 weeks of age. It is important that the feed be procured from a good reliable manufacturer. Most chicken feeds will lose some of their value and may become mouldy if kept under ordinary tropical conditions for more than 30 days.

The feed is placed in clean pans or feeders, arranged so that the chicks cannot walk in the feed. Only enough feed to carry the chicks for one day is put in the feeder at one time. One hundred chicks should have access to about 12 feet of feeding space. If the feed becomes wet or mouldy, the feeder should be emptied and washed clean immediately, and refilled with fresh feed. About 300 pounds of starter feed are needed for 100 chicks until they reach the age of 6 weeks. Poultrymen purchase such feed through local suppliers at about $8.25 per hundred pounds.

Clean, fresh water is available to the chicks at all times, offered in much the same manner as the feed.

Disease Control

Vaccinations against fowlpox and New Castle disease is essential because losses from these diseases may be heavy in the absence of vaccinations. Intra-nasal vaccination against New Castle is given to chicks at the age of one to five days. This treatment is given to Department-produced chicks before they are sold. The chicks are vaccinated against fowlpox at the age of three weeks. For lifetime protection against New Castle, wing-web vaccinations are given at the age of six to eight weeks. These vaccines are sold by the Department to local poultrymen. Most of the chicks raisers have been trained to make the vaccinations. The cost of all three vaccines for 100 chicks is about $3.00.

As a general practice, most poultrymen use sulfathiazol and sodium sulfamethazine (Sulmet) to prevent losses from coccidiosis, coryza, and some other diseases. The product is added to the drinking water according to the directions of the manufacturer. Lice and mites are seldom problems among birds kept in clean, off-the-ground pens. Penned hens are de-beaked to prevent pecking. The operation is performed on birds two to eight weeks old with an electric unit made for that purpose.

In spite of good management, some losses are experienced and some culling must be done. Starting with 1,400 chicks, the poultryman expects 1,300 at 6-week age, 1,200 at laying age, and 1,000 at the end of 15 months.

Growing Pullets

At the age of 6 weeks, the pullets may be transferred to the laying pens or to simple growing pens, where they are kept until the age of 20 weeks. The floor of the pens is wire mesh with openings not more than one inch in diameter. A pen 8 x 10 feet is a good size and will carry about 25 pullets until full-grown. Good ventilation and full protection from rain and wind are still important.

Feed and water facilities are about the same as described for chicks. At this age (6 weeks) the birds are changed over to a "growing" mash. About 2,200 pounds of feed is required to bring 100 pullets to the laying age. Again, only good reliable feed, at a cost of about $8.00 per hundred pounds, is used. Every effort is made to have fresh feed delivered at two-week intervals. Otherwise the feed should be kept in a dry, air-conditioned room.

Housing of Laying Hens

The most popular laying shed is about 22 feet wide, consisting of two rows of pens 8 feet wide and a centre aisle 6 feet wide. The length may vary from 50 to 200 feet. The eave height is usually 6 feet and the ridge 10 feet high. A 3 foot roof projection beyond the eave plate is desirable. The ridge section is usually raised to allow ventilation to keep down roof temperature. Protection from typhoons is provided by 3 feet drop canvas or wood panels suspended from the eave plate. A cement slab floor is desirable, but any hard surface which can be kept dry and from which droppings can be raked, is satisfactory.

The area is usually divided into pens

Wing-web vaccination for lifetime protection against New Castle disease. Right: A practical two-line laying shed divided into pens 8 x 10 feet for 25 hens each.

by wire partitions; an 8 x 10 feet pen for each 25 hens. The pen floor is made of poultry netting (1 x 2 inches), and is about three feet above the ground. No outside runs are provided. In Guam, a 22 x 100 feet, well-constructed frame building, with galvanized tin roof, cement slab floor, and simple feeding and nesting areas, costs about $8,000.

Some Guam poultrymen prefer to keep their hens in single or double cages. The cages may be home-made or purchased as such. The caged hens, because of the ease of culling, are probably more productive than penned hens, but the cost of labour and equipment is higher.

Feed and Water for Laying Hens

Commercial egg producers rely entirely on imported feeds containing well-balanced nutrients to meet the particular needs of the birds. The limited amount of corn grown in Guam commands a price too high to warrant its use as a chicken feed. Local feeds, in addition to creating an unbalanced ration, are quite costly because of the high price of labour in Guam.

Various types of feeders are used satisfactorily. It is important that the hens be kept out of the feed and that the feed be kept clean and dry. An open trough outside the pen on the alleyway side and at the pen floor level is most convenient for putting in the feed. The pen netting can be opened so that the hen can stick her head through a hole about two inches wide and six inches high, and reach the feed.

One hundred laying hens will require 30 pounds of laying ration each day. Such feed costs about $7.75 per hundred pounds in Guam.

It is highly desirable that an automatic watering system be installed. Five cups, costing about $.30 each, are desirable for each pen of 25 hens. The cups for two adjoining pens can be attached to six-foot water pipes extending along the pen partitions from main water pipes along both sides of the alley.

Replacement of Hens

After about ten months of laying in Guam, the hens usually moult severely. At this time egg production drops to a discouraging low, sometimes for two months. Special feeds, vitamins, and electric lights, in addition to careful culling, are used by some to hasten the return to high-level production. Poultrymen who do not give such extra attention may find it uneconomical to keep hens after the start of the moulting period. It costs about $2.68 to bring a hen to laying age, and if the moulting hen can be sold for $2.00, the net cost is only $.68 per bird. It costs about that much to feed a moulting hen for only one month.

The following replacement schedule is suggested:

June 1—*Procure baby chicks.*

July 15—*Move to laying pens.*

Nov. 1—*Hens start laying.*

Aug. 1—*Start culling out moulting hens, also procure new chicks.*

Sept. 1—*Complete disposal of old hens and clean pens thoroughly.*

Sept. 15—*Move pullets to laying pens.*

This schedule will leave the poultryman without eggs through September and October. To overcome this, part of his poultry house can be operated on a schedule starting with baby chicks on December 1. One poultryman brings in 1,000 chicks each month and so has eggs and chickens for sale all the time.

Marketing of Eggs

In the past few years, Guam poultrymen have demonstrated the value of fresh, well-graded, cartoned eggs. The best operators wash all dirty eggs, hold out the cracked, and sort the good eggs into three size classes. For on-location and retail-store sales, the one-dozen cartons are used. It helps to use specially printed cartons showing the name of the poultryman or his trade name. Eggs sold to military agencies, restaurants, etc., are packed in thirty-dozen crates.

In Guam the retail price of fresh eggs may vary during the year as follows:

Small *(to 20 oz. per doz.)*—$.65 *to* $.75.

Medium *(20-24 oz. per doz.)*—$.75 *to* $.90.

Large *(24-27 oz. per doz.)*—$.90 *to* $1.20.

Allowing an average price of $.85 per dozen, 1,100 hens laying 250,000 eggs during their lifetime, will create a gross income of about $17,700.

Marketing of Roosters and Old Hens and Manure

There is very little profit in using imported feeds to grow roosters at the present time in Guam. Poultrymen break about even on selling young males at two to four months of age for $1.00 to $2.00. Those who buy sexed chicks have no problems with roosters. Hens at the age of 15 months, and weighing four to six pounds, are sold at $2.00 to $2.50 each. At the present time there are no facilities for packing and freezing poultry meat, but one poultryman is making such an installation.

Poultrymen in Guam have taken very little advantage of the chicken manure as a source of income. However, action is now under way to dry, pulverize, and package such manure for sale to homeowners and gardeners. The Department stresses the value of chicken manure in composts and on crop areas.

Costs and Income of Egg Production

Variations in methods and facilities employed create some variations in costs

A single-line laying shed divided into pens, with feeder on one side and egg drop on the other side. Right: Home-made cages for individual hens are used by some poultrymen.

of egg production. The following figures are offered as a general guide:

	$
Cost of 1,400 "day old" sexed chicks	*910.00*
Starter feed to the age of 6 weeks	*335.00*
Fowlpox and New Castle vaccines	*45.00*
Growing mash to the age of 5 months	*2,200.00*
Laying ration for 300 days	*6,100.00*
Cartons, one-dozen size	*620.00*
Depreciation and upkeep on house	*1,500.00*
Interest on investment—$16,000 @ 4%	*640.00*
	$12,350.00
Income from sale of eggs	*17,700.00*
Income from sale of old hens	*2,000.00*
	$19,700.00
Balance for labour, incidentals, and profit (15-month period)	*$7,350.00*

It is estimated that one man and family can care for 2,000 laying hens and necessary chicks with the use of modern facilities. There are many small expenses and losses not included in the above figures. However, it appears that egg production, under good management and with good facilities, is a profitable business in Guam.

Mechanization Of Agriculture In The South Pacific

(Continued from page 42)

The size of undertakings and the capital available for mechanization are part of the same problem and their inadequacy can be remedied by similar methods.

The relief and nature of the land play an important part in the future of mechanization. It is quite obvious that the relief naturally determines whether surfaces can be mechanized, but what is less obvious is that, on occasion, it is the structure of the soil which is the prime obstacle to mechanization. Careless working of the ground with mechanical equipment removes the natural covering, causing not only erosion but also destruction of the organic structure in the soil as well as a definite lowering in fertility, and sometimes even poisoning hardly to be anticipated at the outset.

An excellent example is that provided by some soils in the Niari Valley, in French Equatorial Africa, which have been robbed of their natural covering by over-mechanization and are beginning to show signs of manganese poisoning which is leading to a serious reduction in peanut yields.

These observations all go to prove that before deciding to develop an area mechanically, it is necessary to carry out trials whose results could only be applied if planters were required to respect definite rules of cultivation, mainly in regard to protection of the humus content of the soil. At any rate, at the village level, there can be no question of making a sudden change from ancestral forms of cultivation to modern methods. The tendency should be rather towards specialization of existing primitive implements, to be superseded in their turn by mechanical equipment.

The fact that technical resources for agricultural mechanization are generally very limited in South Pacific territories makes extension of mechanical cultivation a somewhat difficult problem. Moreover, it must be admitted that in overseas countries one rarely finds machinery which is specially designed for tropical crops. And yet it cannot be denied that it is of prime importance not only to possess suitable equipment but also technicians capable of operating, adjusting, repairing and servicing such machinery.

The establishment of pilot project farms or farm schools would be, in our opinion, an advisable measure. As well as carrying out field trials, they could also engage in experiments with agricultural equipment, and further provide the islanders with technical education intended to train them, if not to specialist level, at least to that of specialized workers.

Such training would depend not only on teaching staff but also on the agricultural equipment available. And in this respect it should be remembered that the modern tendency is towards multipurpose equipment, which, by making it possible to use the same machine for several jobs, helps defray initial outlay more rapidly by a fuller use of the same piece of equipment.

After this brief survey of the question it would seem possible to draw the conclusion that the extension of agricultural mechanization in the South Pacific is a desirable measure, both for increasing productivity and raising the living standards of the islanders. Nor should it be forgotten that it is most important in all cases that the agricultural policy to be followed be carefully considered beforehand, not only in the light of the social and economic structure of the communities concerned, but also in view of technical conceptions of land utilization which all require a solid basic education.

ORIGINAL LANGUAGE: *French.*

Voandzeia subterranea (L.), Thouars, which is cultivated in tropical Africa and other warm countries such as Brazil and Indonesia, is known by a wide variety of names, including earth pea, Bambarra groundnut, Madagascar groundnut, and stone groundnut.

Some Useful Food Plants

While much has already been done in the introduction of leguminous food plants to the Pacific, the author of this article points out that many interesting possibilities still exist for introducing new species, or for wider cultivation of some already growing in the region.

By H. S. McKEE*

SEVERAL leguminous plants such as the peanut (*Arachis hypogaea*), the Tongan or hyacinth bean (*Dolichos lablab*) and the winged bean (*Psophocarpus tetragonolobus*) are useful, though usually minor, crops in many of the Pacific Islands. They are particularly prominent in the high islands of the Western Pacific, but are found throughout the area, except on some atolls. The leguminous crops already present in the Islands could with advantage be more widely cultivated, while there are others which have proved valuable elsewhere in the tropics but are little used in our area.

Plants of this family make a valuable contribution to the diet, especially by their seeds, which are rich in protein and in vitamins of the B group. The seeds of some species also contain fat, which is almost entirely absent from many vegetable foods, particularly from starchy products such as sago, bananas and the root crops, yams, taros, sweet potatoes and cassava, which are so widely used in the Islands. Other parts of the plant are also eaten, particularly the leaves and the young pods; a few species also have edible roots.

Green Gram A Promising Crop

One important leguminous crop which is almost unknown in the Pacific is green gram (*Phaseolus aureus*, L.). It is widely grown in India and Indonesia, and has recently been tried in Nigeria, West Africa, where it is reported to have yielded 600 lbs. of shelled seeds per acre. The plant is erect, about two feet high, and bears narrow pods two to four inches long and containing up to 15 seeds, which are usually green, but in some varieties are yellow and black.

Green gram seeds contain about 27% of protein and are a good source of thiamin and other vitamins of the B group. They are, therefore, an excellent supplement to a diet based on polished rice. The seeds are easily cooked and readily digested, without the flatulence and other discomforts which are liable to follow the eating of some pulses. They thus form, when thoroughly cooked, a nutritious and easily digestible food for small children. The seeds germinate readily and the seedlings form an excellent vegetable. The prevention of beri-beri by the addition of green gram to a rice diet played an important part in the proof that this disease is of dietary origin.

Green gram is already cultivated to some extent in New Guinea, particularly in the Western part, where it has been introduced by Indonesian settlers; its use could with advantage be extended to many other areas.

Cajanus cajan, Druce, the pigeon pea, is a short-lived perennial shrub usually six to ten feet high. It is deep-rooted and drought-resistant; its dense growth is often useful in checking weed growth and controlling soil erosion. The flowers are yellow or reddish brown; the pods are one to three inches long with two to seven seeds which may be yellow, brown or black. The young pods are used in various Indonesian dishes and the mature seeds, which contain 20% of protein, are eaten after cooking in oil. Besides their value in human nutrition, the seeds provide good fodder for all sorts of stock.

Voandzeia subterranea (L.), Thouars, is a plant first described from Brazil, but probably of African origin. It is known by a wide variety of names, including earth pea, Bambarra ground nut, Madagascar groundnut, stone groundnut, *pois de terre, pois d'Angola, pistache Bambarra*. It is cultivated in tropical Africa and in other warm countries, such as Brazil and Indonesia, but is usually less important than the peanut (*Arachis hypogaea*), which it resembles in producing its seed underground. The earth pea is an annual herb with rather long prostrate runners bearing numerous trifoliate leaves and small, short-stalked yellow flowers which, when fertilized, grow into the ground where the pods develop. The pod is thin-shelled, elliptical or almost spherical and has one or two seeds. The seeds are rich in starch and contain much less fat and somewhat less protein than the peanut. A typical analysis is:—

Starch	58%
Protein	19%
Moisture	10%
Fat	6%
Cellulose	4%
Ash	3%

The seeds are eaten after toasting, or roasted in oil and salted; they are also sometimes made into a paste. In Nigeria the earth pea is regarded as a good feeding stuff for poultry and pigs, and it is stated to succeed on poor soils unfavourable for growing peanuts.

* Formerly Food Technologist, South Pacific Commission.

Sesbania grandiflora (L.), Pers., is a small, fast-growing, short-lived tree often grown in the Islands as an ornament. It grows to 25 feet and has large, much-divided grey-green leaves and large red or white flowers. The pods are very narrow and are 12 inches or more long. In Indonesia its young leaves, young pods and flowers are used as ingredients in various dishes. In Indonesia and Malaya the leaves are reputed to be good fodder for cattle; the bushes are lopped so that the beasts can reach the leafy branches.

Useful For Cattle Fodder

Leucaena glauca, Benth., is a leguminous shrub or small tree native in Central America, but now naturalized at low elevations on many of the Pacific Islands. It is known as mimosa in New Caledonia, as ipil-ipil in the Philippines, and as koa haole in Hawaii. It is recognised in New Caledonia as a useful fodder for cattle, although if not carefully managed it is liable to cover good grazing country with dense thickets impenetrable to man or beast. In some places, as for instance the Ile des Pins, New Caledonia, and Wau, Territory of New Guinea, it is used as shade for coffee. In New Britain it is a widely-used shade plant for cocoa.

Meal from sun-dried *Leucaena* leaves has recently given good results in the Philippines as a substitute for imported lucerne (alfalfa) meal in mixed feeds for poultry. For the main nutrients, *Leucaena* meal showed on analysis better figures than lucerne meal, as is shown in the table below.

Per cent:	Protein	Fat	Fibre	Ash
Leucaena meal	24.4	6.4	9.6	10.6
Lucerne meal	16.1	2.2	27.1	9.1

In grazing trials in Hawaii, beef cattle have done well on pastures containing much *Leucaena.* It is also a suitable feed for dairy cows, though like some other fodders it gives an unusual flavour to the milk if eaten shortly before milking.

Although *Leucaena* has been found satisfactory for cattle and for poultry, its consumption causes the hair of some animals to fall out. This has been noticed with horses and pigs in Queensland and in South America. Sterility in sows has also been attributed to *Leucaena.* Cases of loss of hair in man have been reported from Indonesia, where the shoots and young pods are sometimes eaten when other foods are lacking.

In the Philippines *Leucaena* is an important source of firewood. It grows quickly and gives good results in wet and also in poor dry soils, and has been used to control the tall and very troublesome weedy grass, *Imperata cylindrica* (Kunai, lalang). Young plants grow up through the grass and suppress it in about three years if the area is protected from fire in the meantime.

These few examples do not give a complete list of the leguminous food plants whose introduction or wider cultivation might increase and diversify the resources already available in the Islands. They merely serve to illustrate the possibilities which still exist for introducing new species from outside the area, and for using more extensively those already grown in a few places, or neglected even though their value is recognized in other parts of the world. A great deal has already been done in the introduction of new food plants in the Pacific, but improvements are still possible in the plant resources available to the Island peoples.

Building Small Ships For Pacific Waters

(Continued from page 27)

it does the possibility of salt-choked water jackets with the subsequent cracking of cylinder heads, etc. In most cases outside (keel cooling) copper pipes are a practical solution to this problem. Expensive "heat exchangers" are not always required.

Electrical batteries are another item that require care in stowage and maintenance. Every care should be taken to keep them clear of the bilge. They should be stowed in a lead-lined box and be well ventilated. The "spill-over" from batteries affects both timber and fastenings, so they should be held solidly in position and the liquid levels properly maintained.

In conclusion, it would be wise always to provide for, and keep clear, any necessary limber holes; they are very often overlooked by the builder, and just as often forgotten by the owner.

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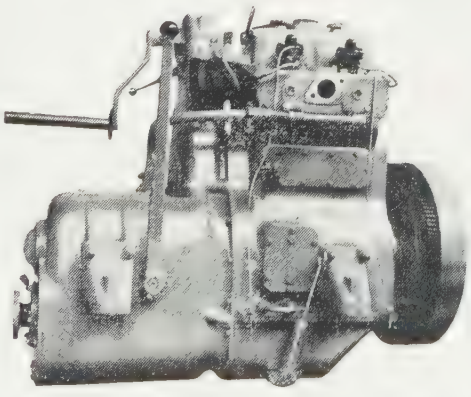

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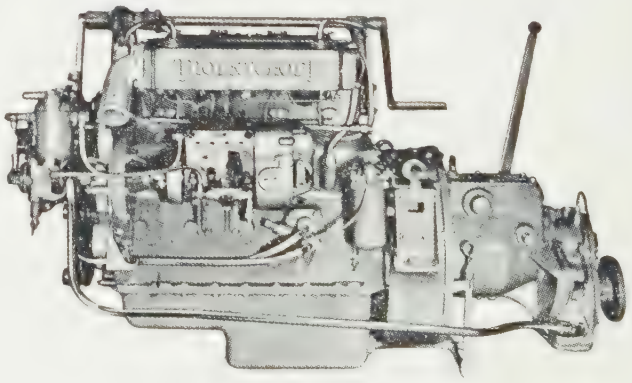

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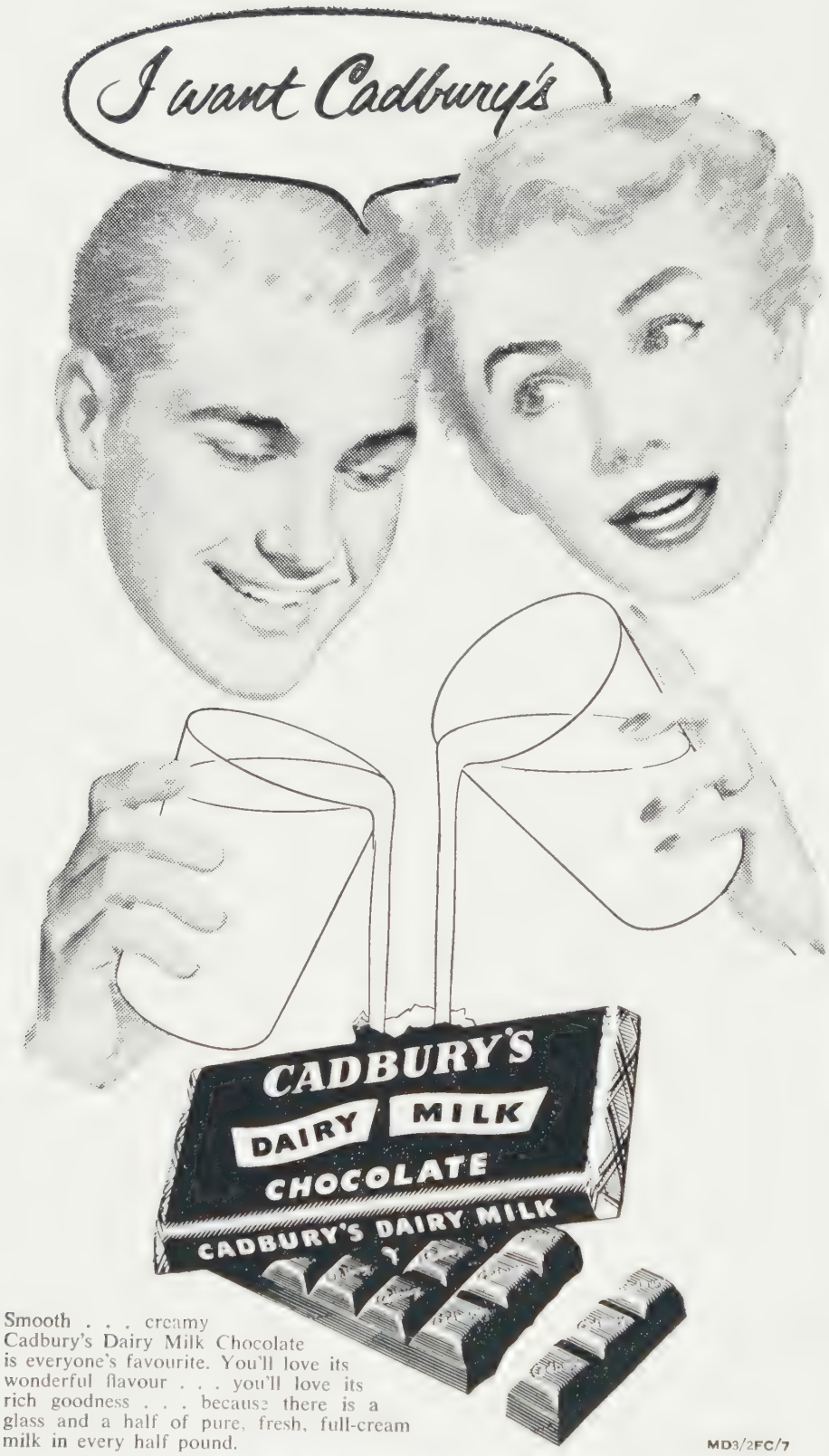

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Should Mechanization Be The Aim Of All Planters?

(Continued from page 24)

acceptance of any form of advanced agricultural techniques. Everyone within the family circle is happy with traditional hand methods of husbandry, and, until standards of living rise, little change in their attitude towards modern improvements can be anticipated. Arguments in favour of field mechanization on such farms may be listened to politely, but judged fatuous.

At the same time I have seen instances where factory mechanization has been adopted to some extent on larger farms and run entirely by islanders. Field conditions on the same estates were still primitive. I am inclined to believe that in such instances the family purse had prevailed after heavy losses had been sustained by endeavours to sun-dry substantial volumes of produce through long spells of wet weather.

On a copra-producing estate the coconut planter is concerned mainly with some good type of hot-air drier, and in the field with motor transport either in the form of a high-sided truck or a tractor and trailer. Comparatively few coconut plantations have been established where arable land would make intensive field mechanization practicable or possible.

Regarding the cocoa or the coffee planter, while he will no doubt consider potential income from his estate and its terrain and soil conditions before committing himself to the purchase of expensive field machinery, a complete mechanization of his processing plant can only work to his advantage.

In the factory, machinery, being continuously under cover and generally more carefully tended, is not nearly so expendable as field equipment, and can be depreciated at a low rate over many years.

There are a great number of well-tried machines for processing tropical products on the market. The smaller planter would be well advised to be guided by what is being used locally on the company properties which turn out similar produce to his own.

Many of the engineering firms which manufacture tropical agricultural machinery are represented by agents throughout the Pacific. These agencies will supply catalogues illustrating many types of machines for handling different volumes of produce. The brochures usually contain either blue-prints or pictures of the ideal factory lay-out. This can be used as a basis for planning, and can be modified to suit local conditions.

A smooth transmission of the product through the processing plant is important, with every phase planned so that manhandling is reduced to a minimum.

Every short-cut devised may represent the saving of one or more units of labour daily.

The mechanization of the processing plant will give the planter lower production costs through a reduction in the number of labourers required to process his crop, and will ensure production in all weathers. At the same time it will protect his product from unevenness of quality, and, by promoting buyer confidence in his brand, will ensure the planter the highest possible market prices.

Pacific Islanders Study Health Education By Group Methods

(Continued from page 21)

activities. They were working together in groups, learning from each other, stimulating each other.

No Formal Examinations

In keeping with this group way of learning and changing attitudes among trainees, no formal examinations were held during the Course. In one sense they were not needed, since throughout the Course trainees had the opportunity of demonstrating their understanding of the material and changes of viewpoint by participating in all of the group activities.

However, it was recognized by the staff that before the end of the Course trainees should prepare a written assignment on the material that had been presented. This took the form of an individual Student Project in which trainees answered a series of questions designed (a) to help them summarize the ideas and main points received during the Course, and (b) help them to outline ways in which health education might be included in their work at home. This assignment served the important purpose of assisting students to plan the practical application in their jobs of the principles, methods, and techniques, that had been discussed in the Course. While the Student Project was completed individually, trainees did meet in professional groups, e.g., nurses, assistant medical practitioners, teachers, etc., to discuss plans for work in their own territories. Sharing ideas among professional groups in this way stimulated formulation of realistic and practical plans.

Obviously a training programme of so flexible a nature required a constant and continuous study of how well it was achieving its objectives. To what extent was it meeting the interests and needs of the students? How well was it producing changes of understanding and attitude? How satisfactory were the various working groups and activities of the Course?

These were questions prominently raised throughout the Course. In the study groups for example, there was al-

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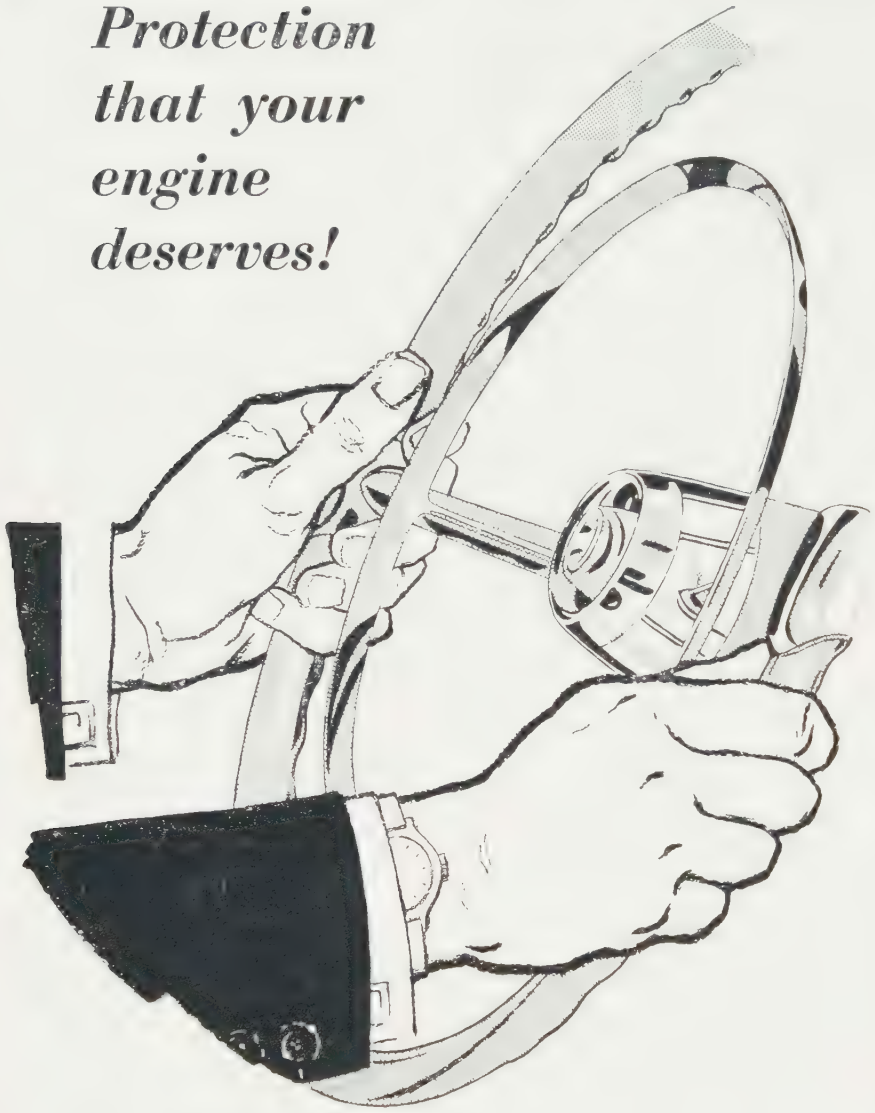

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most constant consideration of the effectiveness of the group in carrying out its tasks. The staff, too, in their regular meetings were making every effort to study the effectiveness of every session and of how different aspects of the Course were being integrated. Half-way through the Course, an evaluation form was completed by all the trainees about comprehension of the material and other aspects of the programme. Suggestions and criticisms formed the basis of further Course planning.

At the end of the Course a final written evaluation was done and specifically requested were criticisms and suggestions of how the Course might have been improved. In a final plenary session there was an open discussion of the merits and weaknesses of the Course. The conclusions reached will be of particular significance in planning future courses of this kind.

Perhaps the best means of assessing how successfully the Course achieved its objective of training in the health education approach was to observe the trainees themselves. All were participating, all sharing in the decision making, in planning to work on the things that were of importance to them. This is the very approach which they will use now in going about their work with their own particular communities. From their experience in the Course they have seen how everyone can contribute ideas. By sharing and planning with others they have better recognized how best to utilize human resources wherever they are.

From the methods and approach of the Course they have seen how even people of such diverse backgrounds as themselves can join together and achieve common goals. By these means they have learned to feel stronger, to share ideas more easily, to work with others more effectively. These are the things that they will take back with them as they return to work in their own territories.

The opinion of the group in this regard is well represented by that of Mr. Tapeni T. Faai'uaso, Assistant Medical practitioner from Western Samoa, as he expressed it in an address given at the closing exercises of the Course:

> "Most of us have now come to understand fully the methods and spirit by which this Course was conducted. It is true that at the beginning most of us had ideas of what the Course was going to be that proved to be wrong. We thought we were going to hear a lot of lectures. We found the methods of group discussion and week-by-week planning rather strange at first—and rather upsetting, too.
>
> "But these feelings soon passed. We saw the value of the new methods and we began to see how they could be used in our own work back home. Without having it forced upon us we saw that new ideas like group discussions, buzz groups, role playing

and so on, could help people to learn and change their ways.

"Another thing which we began to learn—almost without realising it—was that health teaching must be adapted to the cultural background of the people with whom you are working. Here we learnt this in our studies and we learnt it still more clearly as we shared experiences with people from islands and territories so very different from our own."

Perhaps, in a sense, history has been made at this Course. If the group method of learning which has been demonstrated here can take hold in our health work in the Pacific, it may well prove to be the basis for community development activities in every respect.

Tourism In The Pacific

(Continued from page 30)

Airways bring out their new Douglas D.C.8's.

Each of these great liners of the air will carry anywhere from ninety to one hundred and forty passengers per flight. Time will be cut in half or even more. Where Auckland was once seven hours from Nadi the time will be slashed to three, from Sydney to Nadi in four hours, from Honolulu to Nadi in seven hours! The shrinkage of time and distance heralds a great new era of travel.

The picture in shipping is just as gripping. Great forty and forty-five thousand tonners carrying two thousand passengers and more will be on the trans-Pacific run by 1960. Already Orient Line has stepped up sailings across the Pacific, Matson Company have just anounced two additional sailings per year to their present busy schedule, and the P. & O. Company have announced their participation in the Trans-Pacific services commencing next year. Cunard, Matson and Swedish American also have announced cruise sailings to the South Seas next year.

The rate of expansion is inconceivable and the impact it is going to have on the economy of every South Pacific territory is formidable. The future offers great prospects for us all. There is a great new industry awaiting exploitation, a great chance to develop friendly relations between peoples of diverse nationalities, and the opportunity of developing more internal resources with the money brought in by tourists.

Whether we accept the challenge of prosperity depends on our ability to cope with the immediate problems confronting us. The gold is flowing past our doors; have we the tools to attract it?

If the fabulous South Seas with its problems of increasing population, shrinking economy, broadening of outlook, and closer contact with the great wide world beating a path to its doorstep, does not jump on the band waggon of tourist prosperity which will bring it riches beyond credence, then the outlook for the future is indeed one for concern.

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PACIFIC READING

Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to Box 5254, G.P.O., Sydney, Australia.

Notes and News

Fish Preservation Booklet. The booklet *Fish Preservation Simplified* mentioned in 'Notes and News' last April has now been produced. Copies of the French and English editions are available from the Literature Bureau at A.1/- per copy plus postage. This book, which contains much practical advice for islanders on simple methods of preserving fish for later use, is reviewed in the Book List in this issue.

Banana Booklet For Fiji. English and Fijian editions of a 32-page booklet designed to assist Fijian banana growers to market their fruit in better condition have just been produced by the South Pacific Commission Literature Bureau in co-operation with the Department of Agriculture, Fiji, which prepared the material. This booklet was sponsored by the Banana Marketing Board, Fiji, and stresses the importance and necessity for all growers to adopt the correct methods of picking, packing, transporting, and handling their bananas for shipment overseas.

Although intended only for Fijian conditions, other territories may be interested in this book as an example of the possibilities of small-book production using the multilith offset process. An interesting feature of the book is that the text was set up on an IBM electric typewriter. In both versions the simple text is well illustrated with numerous excellent line drawings and the book itself is fitted with a two-colour loose jacket cover resulting in a very attractive, reasonably-priced production.

Single specimen copies with details of production costs are available from the South Pacific Commission Literature Bureau, Box 5254, G.P.O., Sydney, N.S.W., Australia. We shall welcome any enquiries from territories concerning the production of similar type booklets.

A First Hygiene Book. Considerable interest is being shown in this book, not only in the Pacific but also in other parts of the world. Already stocks are almost exhausted of the second impressions of each of the three original editions and a further reprint is being planned for the near future. Orders for this book, which is priced at A.3/- plus postage, should be addressed to the Literature Bureau, Box 5254, G.P.O., Sydney, Australia.

Literature Bureau Staff. Mr. Douglas Pearce, who has been on the staff of the South Pacific Commission Literature Bureau for the last three and a half years, will be leaving the service of the Commission in December to take up the position of Director of a new Literature Agency which is being started for the British Borneo territories.

Reprint—Solomon Islands Stories. In response to many requests a reprint of the *Solomon Islands Stories* booklet has been completed, and copies are available from the Literature Bureau, Box 5254, G.P.O., Sydney, N.S.W., Australia, at A.1/- per copy, plus postage. The first edition proved very popular and all available copies were sold within a few months, necessitating this new impression.

This book contains four folk stories with a Solomon Islands background. It was produced originally by this Bureau on behalf of the Public Relations Officer, Honiara, who prepared the material, as an attempt to provide islanders in the area with some suitable inexpensive reading material. Each story is written in simple English, illustrated with two-colour line drawings and is suitable for either adult reading or for school children at about 4th to 6th year of English level.

Pidgin and Motu Health Leaflets. In co-operation with the Department of Education of the Territory of Papua and New Guinea, the Literature Bureau is producing Pidgin English and Police Motu versions of the health leaflets *Fruit Juice for Baby* and *Clean Water for Your Baby*. Both leaflets are similar in appearance to the already well-known English versions, with the substitution of the appropriate vernacular language for the English text.

Single specimen copies of these leaflets are available on request from the Literature Bureau, Box 5254, G.P.O., Sydney, N.S.W. The Bureau will welcome enquiries from any territory requiring adapted versions of the health leaflets produced to date, or requiring assistance in the preparation of material to suit their own needs.

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Another series of four little illustrated readers about the day-to-day life of two real English children. Each book in the second series contains 36 pages, of which 12 are full-page photographs.

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Vocabulary Exercises For Fourth-Year Juniors

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The exercises in this book have been designed to improve a child's written work in English and in widening his vocabulary. 2*s.* 6*d.*

Counting and Arithmetic in the Infants' School

By W. G. BASS and O. S. DOWTY

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7*s.* 6*d.*

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BOOK LIST No. 18

Items reviewed have been chosen for their general interest or for their relevance to educational and development problems in the South Pacific area. Wherever possible the price stated is the published price in the country of origin.

ENGLISH COURSES

FIRST STEPS IN READING ENGLISH. C. M. Gibson and I. A. Richards. New York: Pocket Books; 35 cents. 1957. pp. 163. Illust.

The authors of this book claim that "anyone who can speak English can start reading it with the help of this book". A good deal of careful thought has certainly gone into its preparation, and it probably comes as near as is possible to teaching a subject without the aid of a teacher. The early sentences of the book are written with no more than seven letters of the alphabet; new letters are introduced gradually and even by page seventy less than half of the alphabet is used. Matchstick figures are used to illustrate the text.

HANDICRAFTS

EQUIPPING THE CLASSROOM. A. Taylor. Edinburgh: Thomas Nelson; Stg.3s.6d. 1953. pp. 90. Illust.

Mainly owing to the cost involved, the equipment necessary for modern teaching methods in schools is often difficult to obtain. This book is designed for the teacher in tropical areas and shows him how he may make for himself a great deal of school equipment. Most of the apparatus described can be made from scrap cardboard, and more than half of it can be made with a sharp knife, razor blade or scissors, a pen, a paint brush, and a ruler.

The first section of the book deals with arithmetic apparatus; this is followed by descriptions of how to make equipment for classes in languages, social studies, and science. Lastly, there is a section containing instructions for apparatus of general use. In the arithmetic and language sections the equipment, where possible, has been dealt with in the order in which it would normally be introduced in the classes.

It is probable that much of the equipment in this book could be made by older pupils and thus relieve the teacher of a good deal of work and provide the pupils with an interesting task. The fact that this book is so practical will undoubtedly mean that it will be welcomed by enthusiastic teachers who wish to provide modern equipment in their schools at minimum cost.

GENERAL READING

UNLAWFUL CARGO, THE CROCODILE DIES TWICE, and ADVENTURES AT DABANGA SCHOOL. S. F. Stevens, Shamus Frazer, P. H. C. Clarke. London: Oxford University Press. Stg. 2s. each. 1954-5. pp. 82-88. Illust. (*Stories Told and Retold.*)

This series, formerly known as *Stories Retold,* has now been extended to include newly-written adventure stories; and the three titles reviewed here all fall into this category. Overseas students often wish to read material with a local background; they also often wish for something which is a little more up-to-date and faster-moving than the somewhat dull fare of bygone days which is so frequently served up to them. This series is now beginning to cater for this need, and these three titles provide well-written, fast-moving adventure stories which we feel sure will be welcomed in tropical areas by students who have completed six years of an English course.

Unlawful Cargo is an exciting story about diamond smuggling in the Middle East and Africa. *The Crocodile Dies Twice* has Singapore and Malaya as a background and is about a school-boy's discovery of a wartime treasure trove. *Adventures at Dabanga School* has an African background and comprises two short stories.

LITTLE READERS FOR BEGINNERS (Step One). London: Longmans, Green & Co.; Stg.1s. each. 1956. pp. 16 each. Illust.

This series of readers has been produced mainly for South East Asian children who are learning English. Each page carries a two-colour illustration and a short text written within a vocabulary of 100 words. Four titles are available in Step One: *Beng Chong's Kite, Ann's Doll, Mat and Asiah,* and *Muthusamy's New Clothes.* The people and the background of this series will be unfamiliar to readers in some South Pacific territories, but nevertheless these books may prove useful as alternative supplementary reading material.

THE BOYS' BOOK OF SHIPS and THE BOYS' BOOK OF AIRCRAFT. T. E. North and Laurence C. Bagley. London: Blackie and Son. Stg.3s.6d. each. No date. pp. 32 each. Illust. (*Blackie's Modern Transport Series.*)

This is an attractively-produced series of small books which includes titles on motor cars and locomotives as well as the two reviewed here.

The Boys' Book of Ships bears a coloured illustration of a ship on each page. The flag of the shipping company which owns the ship is also shown, and details are then given of the ship's capacity and performance. The main routes covered by the shipping line are detailed and the tonnage and names of many of the other ships of the line follow. While most of the shipping lines described are British, there are a few from other countries. This book will be valued by all those who are interested in ships and will prove particularly useful as a recognition manual.

The Boys' Book of Aircraft has been planned similarly. Each page bears a coloured illustration of an aircraft and also, to facilitate recognition, three silhouettes of it from different angles. Each page carries brief details of the performance of the aircraft, etc., and a note describing points which make it easily recognizable. While the book deals mainly with British civil and military aircraft, there are some from other countries.

SCIENCE

ADVENTURE OF THE WORLD. James Fisher. London: Rathbone Books; Stg.15s. 1954. pp. 66. Illust.

This is a really excellent book; it is well-produced, beautifully illustrated in colour, well written, and carefully planned to ensure it caters for a wide range of interests and ages. Apparently the art director and author worked in very close co-operation in order to present their facts clearly; the result is an excellent presentation of the material.

The book tells the story of the world, of life on earth, and of some of the achievements of man. It is divided into three main parts. The first deals with the solar system and the beginning of life on earth, and then details the various stages of life up to the coming of *Homo sapiens.* The second part explains the movement of the earth in the solar system and describes how the seasons and day and night occur; it continues by dealing with sun, rain, wind, and the growth of plants; in conclusion it deals with the effects of wind and water and sun and ice on the surface of the earth. The final part of the book deals with primary production; power pro-

THE POWERHOUSE

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A Fijian edition of one of the titles in
Longmans' Simplified English Series.

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PACIFIC PEOPLES

by

Lyndsay Gardiner, B.A.

This book gives a brief history of the peopling and development of the islands of the Pacific, including Australia and New Zealand.

The first part of the book describes the earliest settlers, their life, work and progress. The second part deals with the coming of the white man and describes his influence from his first appearance in the Pacific to the present day.

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duction; travel; life in plains, mountains, by rivers, in forests, cold countries, deserts, and at sea; religion; and exploration. Numerous shadow relief maps and isotype diagrams illustrate each chapter. Pupils in upper forms of primary schools and in secondary schools, as well as adults, will all find a wealth of interesting material in this book.

SOCIAL STUDIES

THE STORY OF MARGARINE. M. Blackmore. London: Unilever. Free of charge. 1957. pp. 20. Illust. (*Unilever Educational Booklets.*)

This is a re-designed edition of a book which was originally published in 1954. An attractive job has been made of its production, and it is well illustrated with numerous photographs and drawings, many of which are in colour. The book is apparently designed mainly for use in countries where English is the mother tongue, and the text is therefore not as simple as is desirable for use in overseas schools. But most of it will probably be fairly readily understood by those who have completed the sixth year of an English Course.

The book gives a short history of margarine and then goes on to describe early and present-day manufacturing processes and the materials used. It concludes by examining the comparative food values of margarine and dairy products.

The book is available free on application to the Information Division, Unilever Ltd., London, E.C.4, England.

ISLAND HARVESTS: THE FAR EAST. T. Herdman. London: Longmans, Green; Stg.2s.6d. 1957. pp. 40. Illust. (*Longmans Colour Geographies.*)

This well-produced book is illustrated with black-and-white and colour photographs, diagrams, and drawings. It deals with a very wide area, including Malaya, the Philippines, Borneo, Ceylon, Java, while one chapter is devoted to the Pacific. In each area dealt with, a description is given of the salient topographical features before describing the more important aspects of the areas, agriculture, industry, and major imports and exports. There are twenty titles in the Series and they cover most of the world.

OUR NEWSPAPERS. M. F. Moore. London: Macmillan; Stg. 2s.6d. 1957. pp. 64. Illust. (*Macmillan's Social Series.*)

This book describes fairly simply the story of many aspects of the production of a daily newspaper in England. It takes the form of a story in which two children are shown around the offices and press of a daily newspaper and the aspects of production are explained to them. The text is illustrated with black-and-white photographs. Although the production of a daily newspaper in a town in England cannot be strictly comparable with the production of newspapers in the Pacific islands, this book may provide useful material of general interest for social studies work.

COCOA AND CHOCOLATE. Bournville: Cadbury Bros. Stg.1s. No date. pp. 15. Illust.

A description of all the major aspects of cocoa and chocolate from grower to consumer is given in this book. The statistics of crops and consumption relate mainly to pre-war days. Details are given of the major growing areas in West Africa only. A description is given of the growing of cocoa, shipping it overseas for processing, and making chocolate and cocoa powder. A short background history of cocoa is included and charts at the end of the book give details of the food values of cocoa nib, cocoa powder, and plain and milk chocolate.

The text is factual and clearly written, and is well supported with photographic illustrations.

THE STORY OF RUBBER. Wakefield: Educational Productions Ltd.; Stg.2s. No date. pp. 64. Illust.

The publishers of this book have collaborated with the Dunlop Rubber Company in its production. This means that there is a certain amount of material in the book which

might be construed as advertising matter, but it is discreetly presented. Although the book is small, it does give a very full picture of its subject.

Initial chapters deal with the sources of rubber and how it was introduced into various parts of the world from South America. A description follows of the preparation of the soil, the planting of seedling trees, grafting, and tapping and collecting. A description is then given of life on a Dunlop rubber plantation, and the processing of rubber and export of sheet rubber and latex. Finally the book describes the processing which rubber receives in the countries where rubber articles are manufactured; many of the actual processes of making rubber products are covered.

The book is illustrated with first-class black-and-white photographs which really do show clearly the point they are supposed to illustrate; coloured maps, diagrams, and drawings further enhance the value of this useful little book. Although the text is in some places not as simple as might be desirable for use in the islands, there is little doubt that the book will be welcomed as extremely useful social studies material.

THE FIRST TWO YEARS OF GEOGRAPHY. F. C. A. McBain. London: Oxford University Press. Stg.3s.3d. 1956. pp. 86. Illust.

In his introduction to this book the author says:

> "Children of all ages are interested in the world around them. The methods of teaching suggested in this handbook should foster the children's interest so that they develop good habits of study. Such habits are a necessary foundation for all later work in the subject."

The book is designed for the use of teachers in African schools, and is based on the assumption that geography is introduced in the pupil's third year in school. However, despite the fact that the book has been written primarily for African teachers, the intelligent teacher in the Pacific could easily make the few simple changes which would make it applicable to his local conditions.

Two introductory chapters are entitled "How We Teach Geography" and "Geography in the School". The remainder of the book is mainly devoted to teaching about maps. It starts with the simplest situations based on village life and this helps the teacher to work from the pupils' present knowledge and interests. To stimulate the pupils' interest in their own surroundings the book suggests visits to places and people of local interest. This also assists in map work, as the book suggests that the route to the place to which the visit is being made should be mapped beforehand and the pupils taught how to follow map directions. This careful and gradual initiation in map work makes simpler the preparation and comprehension of maps covering the province and the country, details of which follow later in the book.

HOME ECONOMICS

FISH PRESERVATION SIMPLIFIED. H. van Pel. Processed by South Pacific Commission Literature Bureau. 1957. A.1/-. pp. 24. Illust.

Attractively produced in two colours, this 24-page book should be of considerable interest and value to all island peoples. Written by Mr. H. van Pel, the Commission's fisheries expert, and based on the author's article which previously appeared in the Commission's *Quarterly Bulletin*, this book provides the islander with a simple but very practical guide to preserving his surplus catch of fish for later use.

Separate chapters describe four simple but successful methods of preservation—wet and dry salting; sun drying; roasting and smoking; and cooking fish. In each case the text explains fully the preparation of the fish for the particular method of preservation. Also, in the section on Roasting and Smoking, details are given for constructing a simple type of oven from an oil drum for smoking fish. The text is

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Rhinoceros Beetle Campaign In Fiji

(Continued from page 35)

been 57% males and 43% females. During the same period, collections of adults in the crowns of coconut palms comprised 62% males and 38% females, those in breeding places 51% males and 49% females, and those at lights 33% males and 67% females.

7. Use of Traps: The coconut-log trap which has been commonly used in Samoa has not been employed in Fiji. The reasons for our not using this type of trap are that there are few coconut logs available, and that traps scattered over a large tract of country could become prolific breeding places if they were overlooked or neglected.

During 1953 and 1954, thousands of traps were laid down in small pits. The pits were fifteen inches square and two feet deep, and were filled with a mixture containing sawdust, 24 lbs. of finely-ground coconut meal, ½ lb. of B.H.C. 50% Wettable Powder and 4 to 5 gallons of water, the whole being poured loosely into the pit. This mixture was intended to attract and kill beetles, and had given promising results in cage trials. However, as no concrete evidence of the effectiveness of the traps in the field was forthcoming, and as they were expensive, their construction was discontinued towards the end of 1954.

8. Biological Control: Conditions in Fiji have not been favourable for the establishment of parasites of *Oryctes*. The population of the pest is still low, and all known breeding places are destroyed by our field gangs and treated with B.H.C. Nevertheless a large colony of the parasite *Scolia oryctophaga* was introduced from Mauritius in 1954, of which 750 females and 20 males were liberated. There is no evidence that this parasite has become established in the field.

Large importations of predatory beetles from Trinidad have been made. These beetles can sustain themselves on various species of grubs, and hence have more chance of establishment than a parasite whose only host in Fiji would be *Oryctes*. Liberation of predatory beetles in the field since the beginning of the campaign have comprised 16,000 *Histerid* beetles of the genus *Leionota* and 2,700 *Elaterid* beetles of the genus *Pyrophorus*. There is as yet no evidence of establishment, and these beetles are known to have a very long life-history.

In March 1957, Dr. Paul Surany, who is studying diseases of *Oryctes* in Asia and Africa on behalf of the South Pacific Commission, sent from Ceylon colonies of a *Nematode* which can breed on and kill *Oryctes* grubs and beetles. A culture has been maintained in the laboratory in Fiji, and a number of field liberations have been made. Colonies have been sent to Eastern and Western Samoa, where breeding and liberation is being conducted on a large scale. Distribution of the *Nematode* in Fiji is somewhat handicapped by our destruction and treatment of all known breeding-places of *Oryctes*, though the *Nematode* will breed on other species of grubs also. It has been identified by Dr. M. W. Allen, of the University of California, as Genus *Rhabditis*, sub-genus *Rhabditis*, species near *Maupasi*.

General Observations

It can be claimed that the control campaign has so far been successful in its objective of protecting the main copra-growing islands of Fiji from infestation by the rhinoceros beetle. Within Viti Levu the pest is gradually spreading and increasing in numbers, but damage done to coconut palms has been negligible. The casual observer could drive through the whole of the infested area without realizing that the beetle is present. No single palm has yet been severely damaged by the beetle. All this adds up to a very different situation from that which existed in Western Samoa four years after the pest was introduced. In that territory extensive damage had occurred, many palms had been killed, and collections had amounted to millions of grubs and over 100,000 beetles, compared with our 26,000 grubs and 4,000 beetles.

Nevertheless, the pest is steadily spreading and increasing in numbers, and the time is rapidly approaching when changes will need to be made in the conduct of the campaign to keep expenditure within acceptable limits. The changes will take the form of curtailing field operations and concentrating on ports and coastal areas from which the pest might be carried to other islands of the Fiji Group.

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Cocoa Production In Papua and New Guinea

Cocoa production in Papua and New Guinea has increased greatly in recent years. Cocoa bean exports have more than quadrupled in the last five complete years—from 317 tons in 1950/51 to nearly 1300 tons in 1955/56.

The area under cocoa on European holdings increased from 28,000 acres in 1945/55 to 39,000 acres in 1955/56. The indigenous producers increased their area from about 6,500 acres to 7,500 acres in the corresponding period. Although most of the present cocoa production in the territory is carried out by European enterprise, the native grower is of considerable and increasing importance in the industry.

In 1957/58, exports of cocoa from the territory should be about 3,000 tons, and when all plantings come into full bearing in 1962/63, 9,000 tons worth £1,620,000 at current prices should be exported. Australia imports about 12,000 tons of cocoa per annum. Thus the New Guinea cocoa industry should enable Australia to make a significant saving in overseas currency.

In many parts of the territory the soil and climate are well suited to cocoa growing, and the area is relatively free of the major cocoa diseases which cause considerable damage to cocoa crops in West Africa, and the Central and South American areas.

Bright Prospects For Fijian Cocoa Industry

PROSPECTS for a healthy and productive cocoa-growing industry for Fijians in the Savusavu area are bright, according to the Agricultural Officer in charge of cocoa growing there, Mr. J. W. Deering. Following a tour of about 50 Fijian cocoa plantations in the area he reported that practically without exception the standards of management and husbandry were exceedingly high, reflecting the real interest taken in the new crop by the villagers.

The cocoa plantations visited by Mr. Deering ranged from recent plantings to some trees almost commencing to bear. Everywhere, he found the trees in very good condition. "As a consequence of careful selection of land, thorough attention to husbandry, plus the active encouragement given by officers of the Fijian Administration," he said, "the prospects for a healthy and productive cocoa industry in this part of Vanua Levu are very bright indeed."

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